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ABSTRACT

Resulting from a forum for community college leaders exploring the effects of technological change on education, this three-part monograph discusses the role of technology in community colleges and reviews strategies for responding to changes. The first part addresses the vision and leadership needed to bring the colleges into the next century and includes the following articles: "The Importance of Process Innovation to the Community College," by Sean C. Rush; "A Learning College for the 21st Century," by Terry O'Banion; and "Leading the Technology Agenda on Campus," by Charles Spence. The second part analyzes the effects of incorporating technology on educational structures, providing the following articles: "Creating a Learning Culture," by Diana G. Oblinger; "Implementing and Analyzing Operations in Higher Education," by Sunil Chand; "Using Information Technology to Enable Transformation," by Darlene J. Burnett; and "Planning to Take Advantage of Technology," by Gary E. Wenger. The final part provides examples of college plans integrating technology into operations, presenting the following articles: "Strategic Planning for Information Technology," by Dale T. Chapman; "Integrating Technology into the Learning Process," by Richard L. Wright; "Kiosks as Catalysts for Transformation," by Stephen Jonas; and "The Connected Campus and Beyond," by John T. May. Acknowledgments and profiles of the authors and editors are appended. (TGI)

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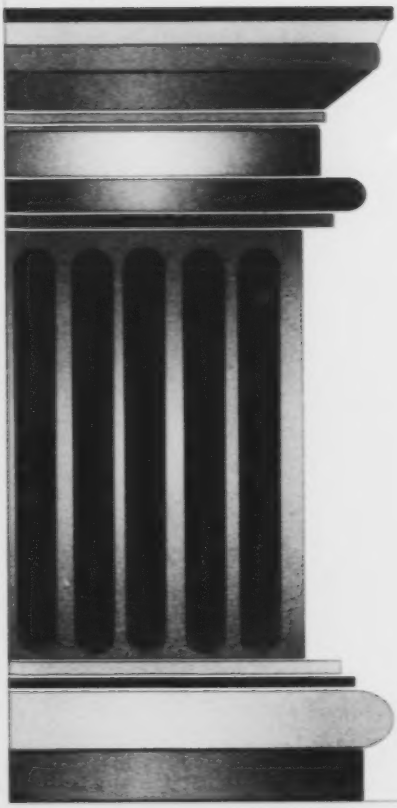
The 21st Century Community College

Technology and the New Learning Paradigm



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The 21st Century Community College

Technology and the New Learning Paradigm

Edited by

Larry Johnson
Sharon T. Lobello

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Foreward

There is an emerging revolution in education to place learning first. Proponents of the new learning paradigm suggest that the traditional model of education, developed in response to an earlier agricultural and industrial society, no longer serves the new information society. The current reform movement, initiated by Terrel Bell's landmark study in 1984, *A Nation at Risk*, has been unable to create significant change because reform efforts have been focused on tweaking a model that no longer works. The reform movement has been trimming the branches of a dying tree.

Proponents of the new learning paradigm call for a new model that reflects the needs of a new society, the needs of new students attending college and the potential of new technologies. At the beginning of 1996, there are no clearly articulated designs for the emerging revolution in learning, but some tentative guidelines are beginning to frame the thinking of key proponents and serve to guide those who will invent new forms of schooling that place learning first.

When community college executives met in the summer of 1995 at the Community College Presidents' Forum, they discussed ways in which their institutions could build learning cultures to benefit their constituents and serve as models for other community colleges across the country. They found unanimous agreement on one basic principle: the student is the real focus of learning. As obvious as this may sound, the majority of the executives admitted that it was not the student who was currently the focus on their campuses, but the process of education itself.

The chapters on the following pages are the summaries of the discussions these leaders had as they tried to reconcile their knowledge of how slow educational institutions sometimes move with how fast society is changing. As a group they feel very strongly that community colleges are uniquely situated to respond to society's needs faster than any other higher education institution because their charters speak directly to meeting the needs of their local communities.

This monograph, distributed by the League for Innovation in the Community College and the IBM Corporation, has been developed to assist community colleges in applying information technology to the improvement of teaching and

learning and institutional management. We are well aware that information technology by itself will not usher in a new model of education, but information technology in the hands of creative faculty members and visionary administrators has more potential as a catalyst for transforming the schools than any other innovation in this century.

—Terry O'Banion
Executive Director
League for Innovation in
the Community College

Introduction

In recognition of more than the twenty-five years of partnership with the League for Innovation in the Community College, IBM Higher Education hosted the Community College Presidents' Forum at the IBM Palisades Executive Conference Center in New York in June 1995. Leaders from thirty-five community colleges were joined by executives from IBM, the League for Innovation in the Community College, and The Robinson Group™ to discuss how the fast moving changes in technology act as a catalyst for educational change.

The Presidents' Forum provided these leaders with an opportunity to discuss the future role of technology in community colleges in light of three major topics: the role of process innovation on the community college campus, the creation of a learning culture, and how to use information technology to enable transformation. The presentations and panels fired friendly debate and led to an exchange of information based on experience about what was working and what wasn't. The imagination of the group was fueled by presentations by industry experts in related fields, such as Dr. Jennifer James, a renowned cultural anthropologist and author who considered the dynamics of change in her presentation entitled, "Building a 21st Century Mind"; and Dr. Stan Davis, noted author and educational consultant who discussed "Life-Long Learning: The Future of Education." The result of the two days of intense discussion is this monograph, *The 21st Century Community College: Technology and the New Learning Paradigm.*

In *The 21st Century Community College*, community college leaders from across the United States put their struggle to reengineer their institutions for the next century on paper in an effort to create a blueprint which colleagues from around the country and elsewhere might be able to use to advance their own institutions. The resulting monograph is organized into three parts: A broad section that speaks to the vision and leadership that must be present to take a community college successfully into the next century. This section includes my own analysis of the importance of process innovation to the community college — or how to avoid finding oneself "poised on the brink of the 1970s." This section also includes a paper by Terry O'Banion, executive director of the League for Innovation in the Community College, reprinted with permission from the *Community College Journal*. A discussion about how to lead

the technology agenda on the campus is presented by Charles Spence, chancellor of the Contra Costa Community College District, and a man who has successfully maneuvered more than one college through the challenges this book addresses.

The second section is led by Diana Oblinger's discussion of the effort that must be exerted from the top to create a learning culture on campus and how technology can aid in the process. From her perspective as the IBM academic program manager she concludes that the move to create a learning culture is "one of the most fundamental challenges facing higher education today." The three remaining chapters in this section bring studied views to the analysis of operations in higher education (Sunil Chand, executive vice president of Cuyahoga Community College); how technology can enable transformation (Darlene Burnett, Higher Education, IBM North America); and the planning that must take place so that an institution can take advantage of the technology (Gary Wenger, computing and information systems director, College of DuPage).

Pragmatists will appreciate the examples given in the third section. Dale Chapman, president of Lewis & Clark Community College, explains how to develop a plan to integrate technology into the campus programs. Then Richard Wright, president of Bakersfield College, outlines how to integrate technology into the learning process. With the last two chapters, advanced applications and their benefits are covered. Stephen Jonas, vice president for administration at Sinclair Community College, describes the path that led them to develop and use kiosks to enhance information access. John May, president of Atlantic Community College, writes about the connected campus — and where it may lead us.

In this monograph, these leaders share their vision for community colleges in the 21st century — a vision that is built on courage and discipline. If this vision is communicated to the readers of *The 21st Century Community College: Technology and the New Learning Paradigm*, then this monograph will have served its purpose.

—Sean C. Rush
General Manager
Higher Education
IBM North America

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1 The Importance of Process Innovation to the Community College

Sean C. Rush
General Manager, Higher Education
IBM North America

In this chapter and those that follow, community college leaders from across the United States and Canada suggest ways to reengineer community colleges for success in the 21st century. The foundation upon which much of the reengineering will be built is a concept that has been discussed a lot lately — process reengineering or process innovation. The concept is closely coupled with another popular approach: total quality management. The difference is that process innovation incorporates the use of dynamic technology and has become, in effect, total quality management at warp speed.

Whatever concept is used, institutions of higher education know it spells change. Historically, however, higher education has been reluctant to change itself. Education's culture and governance mechanisms are simply not predisposed to change. But there is one group of institutions within the academy which has generally responded more quickly and changed to meet society's educational needs. That group is community colleges. There's a good reason for this: the mission statement of virtually all community colleges in the United States calls for responsiveness to the needs of the community, requiring these institutions to act in a timely manner with flexibility in their offerings. It is these schools that will put process innovation to the academic test first.

As willing to approach change as many community colleges may be, most have been unable to keep up with the tremendous pace and amount of transformation occurring in our society today. Colleges which successfully change will use all the resources at their disposal. With the help of process innovation they can build a clear understanding of their institution's mission, customers, values, and vision. Their teams will apply this knowledge to make the implementation of their mission statements a reality even as change swirls around them.

For the purposes of this chapter, process innovation is defined as the "timely transformation of a complex series of tasks to improve quality." Today, the timely transformation of almost any process means applying technology to some part of it. But before this timely transformation can take place, institutions must deal with the factors that inhibit institutional change. They must find ways to articulate these inhibitors and overcome the obstacles common to colleges across the nation. Some of the more common obstacles include:

- Tuition price pressure
- Rising costs
- Technology-resistant faculty
- Funding cutbacks
- Changing demographics
- Growing financial aid
- Shifting customer needs
- Greater public accountability
- Quality requirements.

Obstacles to Change

When there are so many obstacles to change, it takes truly visionary leaders to undertake any amount of process innovation. But those who evaluate their organizations based on the outcomes that are produced and the processes by which these outcomes are achieved will see room for improvement. These are the institutional leaders who place a high value on services that enhance student success. Driven by the demands of customers and competition, these institutions believe that it is up to them to create a quality learning environment for their constituents. Further, they believe that their individual leadership is critical to effect process innovation within their institutions.

According to Don Altieri, president of Anson Community College in Polkton, North Carolina, "Administrative leadership is critical to the change process." Without it, nothing can happen. With the proper leadership, almost nothing can hold back change from happening. The right leader can make change responsive, dynamic, and enduring.

On occasion the college president or the board of trustees inhibits change. This lack of vision by college leaders generally starts with a singularly narrow view of the college's mission statement. To resist change — from admissions policies to recruitment practices to curricular changes — trustees and college administrators can dwell on this limited view of the mission statement, actually undermining any change through inaction tied to the appearance of championing the mission statement. A psychologist might call this "passive resistance." Charged with supporting the mission statement in a climate of shrinking resources, these leaders may feel it is best simply to maintain the status quo.

But, as the song says, "there's no hiding place down there." The problem will not simply go away. The call for change will grow until it swamps an ineffective administration. The answer lies in a three-pronged approach: a thorough orientation of trustees, the formation of mission review teams, and the ability to find new sources of funding. It all boils down to the ability to envision the future and invest in it — not an easy task by anyone's measure in today's socioeconomic climate.

The first step is in the hands of the president, who must communicate to the trustees a clear vision of the role the community college will play in the years ahead. Armed with studies about the growth in lifelong learning patterns and generations of people who will have several different careers, the president may be able to assure trustees that the line of customers will continue to grow for those colleges that responsively meet their community's educational needs. While this is not an overnight process, it should take only months rather than years to achieve. Once trustees can be assured of continued student need and institutional viability, it is essential that they clearly define the changes that must take place in the college to meet this challenge and actively participate in helping the community college find new funding for the necessary resources. The trustees are uniquely situated to garner these funds.

Many community colleges seek additional revenue streams to fund the information technology which supports change on their campuses. The most commonly employed methods are corporate partnerships, sale of bonds, capital campaigns, levy increases, and legislative funding. In all of these instances, trustees should provide active support.

As important as the funding issue is, the biggest inhibitor to change may be a resistant faculty — which brings colleges back full circle to the importance of strong leadership. How do colleges overcome faculty inhibitions to change and technology? There are several approaches which have proven to be successful. Institutions can reward innovation with incentives such as travel to professional meetings. They can offer faculty training in the use of technology. Short-term classes taught by peers, using a collaborative learning style, may be best for faculty who feel that the introduction of technology threatens their jobs or may cause them to be eliminated. But the most effective way to overcome faculty resistance lies in their involvement. Once a team has been formed, they can begin to define what they want to realize from a process innovation effort. This will help move the faculty from a simple awareness of process to full validation of the effort involved. The college will reap the benefit of newly defined processes along with the extra benefits of a renewed sense of teamwork and dedication.

Applying Process Innovation

For a team to apply the concept of process innovation effectively there must be a consensus about what constitutes a process. It would be a mistake to assume that everyone shared the same understanding — far better to assume the opposite and reach consensus together by constructing a flow diagram of a process of which everyone has knowledge. A good example is the process of purchasing.

One college did exactly this and was surprised at what they found. They knew they had a cumbersome purchase order process. What they found was that there were occasions when it was actually more costly to the college to implement the process than to pay for the item being purchased! Their purchase order process called for several layers of signatures — even for items costing less than $50. A quick analysis showed that the process of issuing the purchase order was filled with activities that added no value, slowed the process, and cost more than the item being purchased. It was being done this way because it had always been done this way. The solution was to streamline the process and make someone accountable for it at the beginning. The college was so pleased with the improvement that they celebrated — which was a great way to send a message that process innovation could actually be a good thing.

Deans, department heads, and other managers are responsible for a multitude of processes that have a direct impact on a college's customers. They need to know that

any innovation they take part in will result in an improvement, not simply change a familiar process. They will take their cue from the college president.

Poised for the 1970s

Established procedures are necessary to make operations run smoothly, but they can also be effective inhibitors to change when they become too rigid or ends unto themselves. A colleague used to say that colleges that cling to the comfort of familiarity — doing things because "we've always done them this way" — are poised on the brink of the 1970s. While it is understandable to seek familiarity in these changing times, this path leads to sure failure. To succeed in the 21st century, community colleges must be willing to see things as they have never before appeared. Their vision — or lack of it — will determine the degree of their success.

2 A Learning College for the 21st Century*

Terry O'Banion
Executive Director
League for Innovation in the Community College

Community college faculty and administrators take great pride in describing the institution whose values and culture they champion as "the teaching college." At one time or another most community college advocates have compared their institution with the university by declaring their commitment to teaching over research. To drive the point home, community college advocates often note the university's propensity to use graduate students to staff large lecture sessions while they, more committed to quality teaching, make teaching the priority of professional staff.

The community college literature, not unexpectedly, is full of references reflecting this viewpoint regarding the importance placed on teaching in the community college. One of the most significant documents ever written on the community college, *Building Communities* (1988), the Report of the Commission on the Future of Community Colleges, echoes this view over and over: "Building communities through dedicated teaching is the vision and the inspiration of this report. "(p. 8) "Quality instruction should be the hallmark of the movement." (p. 25) "The community college should be the nation's premier teaching institution." (p. 25)

In the campus literature of community colleges, the value placed on teaching is clearly reflected in their mission statements. Robert Barr, director of institutional research and planning at Palomar College in California, says, "It is revealing that virtually every mission statement contained in the catalogs in California's 107 community colleges fails to use the word 'learning' in a statement of purpose. When it is used, it

*This article is reprinted with permission from the December/January 1995-96 *Community College Journal*, published by the American Association of Community Colleges.

is almost always bundled in the phrase 'teaching and learning' as if to say that, while learning may indeed have something to do with community colleges, it is only present as an aspect of teaching." (p. 2)

There is nothing inherently wrong with placing great value on teaching except that it has led to placing more value on teaching than on learning. As a result, educational institutions accommodate the needs, interests, and values of their employees more often than the needs, interests, and values of their customers. This accommodation has created an embedded time and place-bound architecture of education — so many minutes in class, so many classes a day, so many days a term, so many units a diploma or degree, etc. — that restricts students and faculty to a learning environment designed for an earlier agricultural and industrial society. It is noteworthy that this architecture constitutes the pegs from which hang the negotiated elements of so many union contracts, as if educational staff were struggling to change or control these cumbersome structures. Schooling today is no different than schooling was one hundred years ago. "For better or worse, the book, blackboard, and lecture continue to dominate education." (Green and Gilbert, 1995, p. 10)

Changes in education come about slowly — perhaps too slowly for the rapid pace of change that marks modern social systems. In *The Monster Under the Bed* (1994), Davis and Botkin declare that, "Over the next few decades the private sector will eclipse the public sector and become the major institution responsible for learning." (p. 16) More pointedly, Lewis J. Perelman (1992) observes, "So contrary to what the reformers have been claiming, the central failure of our education system is not inadequacy but excess: our economy is being crippled by too much spending on too much schooling... The principal barrier to economic progress today is a mind-set that seeks to perfect education when it needs only to be abandoned." (p. 24)

These critics may overstate the case, but the urgency to change education is evident even within established educational circles. The Wingspread Group on Higher Education (1993), in an open letter to every president of an institution of higher education in America, urged, "We must redesign all of our learning systems to align our entire education enterprise with the personal, civic, and workplace needs of the 21st Century." (p. 19) "Putting learning at the heart of the academic enterprise will

mean overhauling the conceptual, procedural, curricular, and other architecture of postsecondary education on most campuses." (p. 14) In any case, individual critics and group commissions are calling for major changes in educational systems in every sector of education in America. Paul Privateer (1994), a professor at Arizona State University, has perhaps captured the flavor of these calls for change best. "American education in general is at a strategic anxiety point in its evolution. We're at a very odd midpoint between the death of one kind of paradigm of learning and the yet-undefined formation of an entirely new way of learning." (p. 22)

Community colleges are often the first institutions of higher education to feel the impact of change because they are positioned so closely to main street values in American society. Too, through experience they have become responsive to new needs and new opportunities, developing a well-deserved reputation for innovative and entrepreneurial solutions. Given these characteristics, it is not surprising to find community colleges in the vanguard of exploring new approaches to learning.

At the moment, most community colleges are struggling to operate within established paradigms that are dying. Their response has been to bolt on new programs and activities, often at increased costs, to old structures to improve on the model of "the teaching college." Community colleges have been national leaders in applying information technology, developing collaborative learning models, and incorporating assessment and outcome measures — all for the purpose of improving on the function of teaching. These innovative applications are improving the teaching process in community colleges, and they should be encouraged; but there will be a limit on improving learning outcomes when these innovations are applied in the context of the traditional teaching model.

Tweaking the current system by adding on the innovation du jour will not be sufficient. The reform movement of the past decade has been trimming the branches of a dying tree. A few community colleges, however, are beginning to recognize the need for change and have launched efforts to reengineer their institutions around new concepts that place learning first. It remains to be seen whether these efforts will result in replacing dead trees with new stock or only grafting temporary solutions to a dying tree.

Flagship Institutions on the Move

A handful of community colleges are leading the way to create "the learning college of the 21st century," and while none of these colleges claim to have achieved their goals fully, they are at least engaged in institutionwide efforts to construct a new kind of institution that places learning first. The early efforts of three of these leading-edge institutions are instructive for other community colleges that will soon join the journey.

Lane Community College, Eugene, Oregon — Since 1993, Lane Community College has been involved in an institutionwide "restructuring" process designed to make sure the college changes to respond to changing times. In a memo to all college employees, President Jerry Moskus noted there had been major changes in the environment, technology, politics, leadership, and growth in the past five years, and urged, "To continue to be a strong, effective community college, Lane must rethink nearly everything it does." To begin that task, all faculty and staff members at Lane were invited to participate in special sessions to create a new organizational structure based on a new vision of the future.

That new vision, developed by faculty and staff and approved by the board of trustees, is captured in a brief statement: "Lane Community College provides quality learning experiences in a caring environment." Throughout the document on restructuring, the language of learning reflects the values and focus of the emerging vision. For example:

- Lane is centered on learning and will assume new responsibilities only when they involve learning.
- Everyone at Lane — students, staff, etc. — must be engaged in learning. The organization must be a learning organization.
- A high quality learning experience can only be provided by a college devoted to services that meet the needs of customers both external (students and other beneficiaries) and internal (staff are each other's customers).
- Rules and procedures must all be evaluated on the basis of whether they promote learning.

Halfway through 1995, Lane has made measurable progress toward this vision. The college has been restructured to better meet the learning needs of students and the

community. For example, instructional departments have been grouped into six "clusters" that parallel the six career strands in the State of Oregon's education reform act. The college also is working hard to nurture a caring environment through extensive staff training in teamwork, conflict resolution, change management, and diversity. A cadre of trained staff plan staff development activities and help other staff practice their new skills. Recently, Lane's transition was given a real boost when voters approved a $42.8 million bond measure. The bond will enable the college to make current facilities more learner friendly and to build and equip small learning centers at ten of the high schools in the college's 5,000 square-mile district.

Palomar College, San Marcos, California — Changing the language it uses to reflect and encourage new values and behavior, Palomar College has also been a leader in moving toward "the learning college." In 1989, Palomar created a Vision Task Force whose work led to the notion of shifting its mission, indeed, its driving paradigm, from instruction to learning.

Faculty and staff at Palomar have ferreted out the previous emphasis on teaching and instruction in all their official and unofficial documents and now emphasize learning in all their communications. As part of the comprehensive effort to move the college from the "old" paradigm "to provide instruction" to the "new" paradigm "to produce learning," faculty are beginning to reflect some significant changes.

Keying off a new mission statement and an educational master planning goals document focused on learning, faculty in an April 1995 Colloquium on Innovation and Student Learning made a number of recommendations that support the development of "the learning college." Among these recommendations, faculty suggested that Palomar should:

- Establish a research and development fund to support innovation and student learning.
- Create a systematic program of outcomes assessment that will give faculty the tools to compare educational programs and approaches and provide evidence of actual learning outcomes.
- Suspend sabbaticals and professional development programs for one year and divert the funds of approximately $300,000 into a budget for new programs and systems.

- Encourage and support the development of open entry/open exit classes which span the entire school year.
- Explore and develop alternate scheduling patterns based on the needs of students.
- Explore ways to reward faculty and staff for innovations including academic rank tied to learning outcomes and rewards to teams of faculty who create successful learning outcomes.

A general recommendation from this colloquium suggested that "Palomar College should actively identify the barriers to innovation and student learning imposed by the State of California. We should then share these barriers with our local state representatives and ask them to help us overcome them." Faculty also recommended that Palomar apply to become a Charter Community College, a concept under review by the state legislature that will allow colleges to waive many of the barriers to creating innovative programs that place learning first.

Maricopa Community Colleges, Phoenix, Arizona — In 1993, Maricopa was invited to participate as one of thirty institutions of higher education in the Pew Higher Education Round Tables. The purpose of the Pew Round Tables is to assist colleges and universities in a restructuring process intended to address rapid change. In the earliest discussions at Maricopa, participants agreed that profound, systemic change was needed and focused on: 1) the need for a new learning paradigm that is learning-centered and student-centered, and 2) the need for more collaboration and integration within the Maricopa District.

Round table members began discussions by identifying characteristics of the traditional learning paradigm and the desired learning paradigm. These discussions confirmed the need for a new vocabulary and resulted in agreement on key concepts of the desired learning paradigm as follows:

- Learning is a process that is lifelong for everyone and should be measured in a consistent, ongoing manner focused on improvement.
- Everyone is an active learner and teacher through collaboration, shared responsibility, and mutual respect.

- The learning process includes the larger community through the development of alliances, relationships, and opportunities for mutual benefit.
- Learning occurs in a flexible and appropriate environment.

Throughout 1994, the results of the round table discussions were shared with all faculty and staff in the Maricopa District, and several projects were initiated to move the district toward "a learning college." An example of the scope of these efforts, Project Apollo, will capitalize on the sophisticated technology base already established at Maricopa to make it more learner-centered. Chancellor Paul Elsner has said, "The learner-centered system will result in greater opportunities for students who will be empowered to serve as navigators of their own learning paths."

In addition to Project Apollo, in January 1994, Maricopa launched "Strategic Conversations" with its governing board members and internal and external communities. The Strategic Conversations represent a significant shift in the way Maricopa's governing board conducts its business. These conversations, up to two hours long, are now open to active participation from members of internal and external communities and have been used to develop and revise new statements of vision, mission, goals, and values. Each strategic conversation is structured by a cross-functional team which prepares a brief background paper, conducts interactive exercises, and facilitates the participation of those attending the meeting. The purpose of the conversations is to promote learning and a greater understanding of the challenging issues facing Maricopa and its communities. This new process encourages individual and organizational learning.

The focus of each conversation differs. Some conversations have been on creating definitions of learning organizations, reviewing examples of established programs at Maricopa that already reflect the learning organization, changing roles for staff, and assessing individuals and the Maricopa organization as a reflection of "the learning college."

These three leading community colleges are examples of institutions attempting to move from "the teaching college" to "the learning college," but these brief descriptions of their early efforts do not do justice to the range of activities in which each is involved or the amount and quality of work contributed by staff and faculty. Nor do these brief descriptions capture fully the substantive change that is occur-

ring in these institutions. It will take a number of years before these pioneering community colleges can unfurl their visions more fully and develop the comprehensive changes to which they are committed. In the meantime, what they do will be worth watching, and what they have already experienced suggests emerging guidelines that may assist other community colleges that commit to the journey. Community colleges that plan to move their institutions toward becoming "a learning college" should:

- Develop their own language to reflect a new focus on learning rather than on instruction and teaching.
- Identify barriers and limitations of traditional models of education.
- Develop definitions and frameworks for a desired learning paradigm.
- Realign current structures to accommodate collaboration and teamwork within the college community.
- Review the role of technology in transforming the learning environment.
- Involve all institutional stakeholders in the change process.
- Organize and review all activities related to these changes in the context of evaluation.

These leading-edge institutions may be the ones that survive into the 21st century, but even they are caught, as Robert Frost said, "betwixt and between the forest brown and the forest green." Saddled with old paradigms and insecure and reluctant faculty and administrators, how are these institutions to ride into the sunset of the 20th century well-equipped for the new adventures promised just over the hill in the 21st century? The truth is, most institutions will not be part of this future if they continue to tweak the old paradigm for incremental changes; only those institutions that are capable of swift and radical change will see the promised land.

Toward Radical Change

We need dozens of models of radical change in education today to encourage experimentation by all sectors of education. In the following section, the basic elements of one model are outlined. The learning college places learning first and provides educational services for learners anyway, anywhere, anytime. The model is based on the assumption that educational experiences should be designed for learners rather than for institutions and their staffs. The term "the learning college" is used throughout as a generic reference for all educational institutions.

The Learner Engages the Learning College

For the next decade, at least, there will be formal institutions (high schools, community colleges, four-year colleges, and universities — owned and operated by many entities) that will attract learners to participate in their activities — on established campuses and other locations through technological links. At the point of engagement (first day of tenth grade, summer admission to fall freshman year, beginning graduate school, in-plant, six-week training modules — and in the future on any day of the year) the learning college will initiate a series of services to prepare the learner for the experiences and opportunities to come. In a seamless educational system, learners will begin this preparation at the age of four or five and continue it throughout their lives.

The services will include assessing the learner's abilities, achievements, values, needs, goals, expectations, resources, and environmental/situational limitations. A personal profile will be constructed by the learner in consultation with an expert assessor to illustrate what this learner knows, wants to know, and needs to know. A personal learning plan will be constructed from this personal profile, and the learner will negotiate a contract that outlines responsibilities of both the learner and the learning college.

As part of the negotiated contract, the learner will purchase learning vouchers to be used in selecting from among the learning options provided by the learning college. The assessment information, the terms of the contract, historical records from previous learning experiences, and all pertinent information will be recorded on the learner's "smart" card which serves as a portfolio of information, a lifelong record of lifelong educational experiences. The smart card, similar to an ATM card already widely used by banks, will belong to the learner, who will be responsible for keeping it current with assistance from specialists in the learning college. While the smart card will contain information on learning outcomes and skill levels achieved, work experience, and external evaluations, other learning colleges and employers will develop their own systems to verify what they need to know about the learner.

As an additional service, the learning college will provide orientation and experimentation for learners who are unfamiliar with the learning environment of the learning college. Some learners will need training in using the technology, in devel-

oping collaborations, in locating resources, and in navigating the learning systems. Specialists will monitor these services carefully and will be responsible for approving a learner's readiness to fully engage the learning opportunities provided.

The Learner Selects Learning Options

In the learning college there are many options for the learner — options regarding time, place, structure, and methods of delivery. The learner has reviewed these options and experimented with some that are unfamiliar. Entry vouchers are exchanged for the selected options and exit vouchers held for completion.

Each learning option includes specific goals and competency levels needed for entry, as well as specific outcome measures of competency levels needed for exit. Learning colleges are constantly creating additional learning options for learners. Some learning options include:

- Prescribed, preshrunk portable modules in such areas as general education core courses or specific skills training. These are universally recognized packages developed by national knowledge organizations such as the American Medical Association or major companies such as AT&T™.
- Stand-alone technological expert systems that respond to the idiosyncrasies of a specific learner, guiding and challenging the learner through a rich maze of information and experiences. IBM's *Ulysses*™ and Philips' Interactive Media of America's *The World of Impressionism*™ are prototypes of the potential of such systems.
- Opportunities for collaboration with other learners in small groups and through technological links. Learning communities developed in the State of Washington and the Electronic Forum developed by Maricopa Community Colleges were early pioneers.
- Tutor-led groups, individual reading programs, project-based activities, service learning, lectures, and laboratories — all of the established learning options, since many of these work well for many learners. These established learning options will not be constrained, however, by the limits of time and place, but will be designed for the needs of learners and framed by specific goals and competency levels needed for entry and specific outcome measures of competency levels needed for exit.

A major goal of the learning college is to create as many learning options as possible in order to provide successful learning experiences for all learners. If the learner's goal is to become competent in English as a second language, there should be a dozen or so learning options available to achieve that goal. If the learner's goal is to become competent in welding a joint, there should be a dozen or so learning options available to achieve that goal. If one option does not work, the learner should be able to navigate a new path to an alternative learning option at any point.

To "manage" the activities and progress of thousands of learners engaged in hundreds of learning options at many different times, at many different levels, in many different locations, the learning college will rely on expert systems based on early developments such as General Motors' Computer Aided Maintenance System or Miami-Dade Community College's Synergy. Without these complex systems the learning college cannot function. These learning management systems are the breakthroughs that will free education from the time-bound, place-bound, and role-bound systems that currently manage the educational enterprise.

The Learner's Needs Define the Roles of Education Providers

The learning college will contract with many specialists to provide services to learners. Specialists will be employed on a contract basis to produce specific products or deliver specific services; many will work part-time, often from their homes, linked to learners through technology. Learners themselves will play important roles in assisting other learners. "Wonderful teachers" and "great administrators" will be of no use in the learning college unless they can deliver special skills and abilities required by learners. Learners in the learning college will need specialists who can:

- Assess learner abilities, achievements, values, needs, goals, expectations, resources, and environmental/situational limitations; create personal profiles and personal learning plans; negotiate learning contracts; and assist in developing a personal portfolio on a smart card.
- Design and create learning options in a variety of formats based upon the latest learning and adult development theories.
- Design and create expert systems to manage and track the activities of learners.
- Train learners in the use of a variety of technologies and systems.

- Select, update, and repair software and hardware.
- Assist in creating and convening collaborative networks of other learners.
- Access, synthesize, and update constantly expanding databases of knowledge.
- Establish and clarify skill levels, competencies, goals, and outcomes.
- Establish and maintain a clean and attractive environment for learning for those who elect to participate in learning "on location."
- Guide and coach learners needing individual assistance.
- Arrange new options for new needs.
- Challenge learner assumptions, question their values, and encourage their explorations.

This is but a sample of the kinds of skills and abilities that learning providers will need to create optimal conditions for learning. Learners will also benefit if many of the individuals with these skills and abilities exhibit characteristics of intelligence, compassion, integrity, humor, and patience.

In this briefly-sketched ideal of the learning college, there is little mention of teaching and instruction. Perhaps it is possible after all to place learning first, to make the first part of Chaucer's observation of his scholar "gladly would he learn" the dictum of a future system of education. The obstacles to creating a learning college similar to that outlined here are overwhelming and familiar to all who desire change. Several years ago, however, it was inconceivable that communism in the U.S.S.R. would crash and that Republicans would reign in the U.S. Congress. The surprise of change these days comes about fairly regularly; maybe education is next on the list.

3 Leading the Technology Agenda on Campus

Charles Spence
Chancellor
Contra Costa Community College District

No one should be surprised by the notion that organizations have to deal with change. You don't need a Ph.D. or an MBA to understand that tomorrow the weather will be different, Congress will change a law and a technology company will issue a new iteration of their most popular software package. The point is that the only thing new about change is the proliferation of cliches it has spawned in the last five years. Change is a built-in component of the natural order. Charles Darwin called it evolution.

Given that educational institutions will always operate in a changing environment, the ten community college leaders who contributed to this session discussed the need for leaders to focus on the results of change and how they intend to position their institutions to prosper in the anticipated environment. Discussion of these issues, combined with the decisions it breeds, is part of the process for creating a competitive advantage for community colleges. It's also a significant element of leadership. When attempting to create a desired future environment, regardless of the depth of time being considered, technology looms as a faceless monster in a closet of anxieties — especially to those whose childhood memories of technological advancements include the jump from radio to television and then from black and white to color.

Technology has an infinitely redundant relationship with the concept of change. Today's environment provides challenges, problems, and opportunities. Organizations improve and apply technology to answer those demands. Technology inspires evolution which requires new technology which inspires further evolution. A leader

attempting to define how the organization will behave at any point in the future must have an intimate understanding of the technological paths leading to that future.

But really, what do presidents know? The boards didn't hire them because of their knowledge of satellite communications or even their aptitude for programming a VCR. They hired them to provide visionary leadership, to recognize the importance of critical issues to strategic planning (including technology), and to stimulate, if necessary, the energy required to transform the institution from the current state to the desired future. Recognizing that few community college CEOs will ever possess specific knowledge related to various technological functions, applications and possibilities, the CEO's role regarding technology becomes a more directed subset of his overall role. In other words, the CEO should:

- Provide visionary leadership with respect to technology.
- Articulate technology's role in the institution's strategic plan.
- Stimulate the energy necessary to move forward.

Providing Visionary Leadership

The importance of technology in the business of learning is too vital to be left to chance. Failure to plan the integration of technology into learning and work processes will ultimately disable the organization's attempts to fulfill its mission and goals and cause the institution to stagnate in a rapidly evolving environment. Faculty, staff, and even other administrators will take their cues from the CEO, who should openly express a commitment to planning, coordinating, staffing, and funding technological priorities.

Even with the static funding situation that many institutions must endure, the CEO should speak of technology as an investment in the continuous improvement of teaching and learning as well as the vital support functions of the institution. Technological improvements obviously represent an expense, but in many cases, the fear of cost stifles innovation at its genesis.

Appropriate leadership obviously includes a consideration of cost, but good technological decisions will result in acceptable returns in areas of classroom success, student retention, student satisfaction, customer service, interorganizational

linkages, program improvements, work process efficiencies, and cost savings. Visionary leaders must penetrate the immediate issue of cost and determine ways to measure the deeper value of technological decisions. For instance, a computer-assisted learning lab which dramatically reduces the time it takes adults to learn adequate reading skills and improves student success could carry a price tag of one million dollars or more. However, the value of this investment, in terms of the productivity of a literate work force compared to an illiterate work force, would likely exceed its initial cost. Visionary leadership requires a quantifiable assessment and measurement of the larger picture (including low cost, low tech alternatives) instead of a myopic dismissal of potentially rewarding projects on a superficial basis.

Measuring technology's impact on learning further requires the characteristics of visionary leadership. Fully investing in unproven, high-cost technology is something like diving into the shallow end of a pool — it might turn out just fine, but failure could have paralyzing consequences. Using scientific methods of research and analysis before making a large commitment effectively changes the angle of entry into the water. For instance, lower cost pilot projects can be measured against control groups to see if a particular idea holds merit. If the idea fails, the consequences might be more like a stubbed toe than a broken neck. Leadership must eliminate the fear of failure from the organization to create an internal culture in which such experimentation is encouraged.

Technological issues require leadership. The leader who dedicates personal resources to technology will begin to better communicate the importance of technology planning to staff members. If the clock on the VCR in the president's office is flashing, he should set it. The president should carry a laptop into a meeting and take notes. Send e-mail. Use multimedia in presentations. Attend a training session in a word processing or spreadsheet application. Not only will new ways that technology can ease life become apparent to the president, he will begin to inspire others to think about ways technology can be better applied for student benefit.

Making Technology Part of the Strategic Plan

That new personal computer installed yesterday will be obsolete in three years. Sure, it will run forever, but in three years, the applications it needs to perform and the information it needs to process will require more electronic muscle than it can deliver. Because of the rapid advancements in technology, planning three years in

advance is considered long range. Trying to plan five years in the future is an exercise in science fiction. The speed at which technology evolves demands careful and precise planning.

Planning for technology must begin with the stated vision, mission, and goals of the institution. These three documents are like the constitution for the organization; they don't specifically answer all the questions, but they do provide a framework for decision making. The participants in the planning process will each bring a different agenda to the table; the organization's vision, mission, and goals provide a common platform for dialogue when individual agendas clash.

The broad institutional impact of technological decisions and the cost of poor decisions demand a cross-functional approach to technological planning. Consideration should be given to the technological awareness of the representatives who will develop the plan. If technology awareness training is needed, it should be provided.

Technology generally takes one of two tracks within the institution: management information systems or educational improvement systems. Economies of scale can be achieved if both tracks are served by the same technological infrastructure, but determining how that infrastructure will serve each group creates an initial dichotomy with educators on one side and staff support on the other. While it is common in organizations for the technology function to report to either an administrative or academic vice president, this reporting relationship raises concerns and at least the perception of favoritism within the track excluded from the formal hierarchy. Regardless of whether perception is reality, this structure may be a barrier to consensus building. Some institutions have dismantled this barrier by placing the technology department in a neutral position.

A further cloud on institutional technology issues is the merging of multiple components (such as computing, telephone, and television). Merging these technologies seems more complex than it really is — they are all basically computers. What organizations usually lack is a cross-functional consensus on how to merge them in the best way for the long term benefit of all those involved.

A cross-functional approach to technology planning helps the organization traverse yet another barrier to technological evolution: funding. As mentioned

before, a big price tag shouldn't stop a good idea, but an expensive idea may force the elimination of a few existing programs of lesser quality. Because new funds are scarce in the education industry, new projects are fed by reallocating funds from existing programs. This is the basic theoretical tenet of free market economics: resources should be employed where they are most effective. But in practice these decisions are burdened with all kinds of political baggage. Properly directed, however, a cross functional planning group should be able to make these decisions, especially if they are working within a culture that has a clear strategic focus.

An institutional strategic plan, linked to the overall vision, mission, and goals of the institution, should not only define the required infrastructure but also identify and prioritize the units that will tap into that infrastructure. It should delineate a clear policy on hardware replacement and software upgrade and replacement. At this stage, departments and individual staff and faculty members should have the opportunity to compete (perhaps in a mini-grant format) for resources. The process is as important as the outcome and requires fairness and equal consideration of all proposals. Internal morale will be damaged well beyond the scope of technology if even the appearance of favoritism or impropriety exists. If the playing field is level and the rules of engagement are adhered to, people can more easily accept defeat. Again, a neutral technology department can assist greatly in leading the college-wide dialogue regarding priorities and be in a better position to broker peace should turf wars flare. As priorities and implementation timelines are determined, the team should also build a replacement process for hardware and software.

As priorities are added to the plan, the technology department can also identify the support structures (network engineering, troubleshooting, training, maintenance, repair, etc.) that should grow as the technological system grows. Failure to address necessary support structures in the plan (or failure to grow appropriately as the plan is implemented) will result in unnecessary inefficiencies caused by computer down time and employees who merely scratch the surface of their technological capabilities.

By addressing the infrastructure, priorities, funding, and support structure on a college-wide basis (with the guidance of the institution's vision, mission, and goals), faculty and staff can make unit based technology decisions within the overall col-

lege parameters. At this stage, the process can be decentralized so that faculty can control educational technology decisions, based on measurable learning outcomes, and staff can control management information technology decisions.

Stimulating the Energy to Advance: Technology in Education

Educational institutions will never judge themselves on the records they keep and the reports they can generate. Learning is the bottom line, and that is where technology can have the greatest impact on organizational quality. The CEO is the catalyst for encouraging faculty to define where and how technology should be used in the instructional process. The CEO should emphasize that the objective isn't to pull as much electronic gear into the classroom as possible. Rather, the objective is to improve learning. Technology merely offers many tools and possibilities that, applied creatively, can help achieve this objective.

The president's commitment to technology in strategic planning and budgeting provides the initial force in motivating faculty to begin experimenting with technology in the classroom. When the commitment from the top is in place (demonstrated by action, not talk), the internal culture will begin thinking about possibilities instead of scrutinizing barriers.

Despite the fact that some faculty will resist technology as a teaching tool, faculty should decide when and how technology will be used in the educational process. The institution should eliminate the obstacles and frustrations associated with the application of technology by providing appropriate technical support and training. Faculty members should be concentrating on how the application will integrate with their instructional objectives, not how the terminal will integrate with the mainframe.

Appropriate technical support and training, as well as giving faculty and staff the opportunity to participate in the decision-making process, will eliminate many of the fears associated with the use of technology. As technology improves and becomes more user friendly, the need for support will decrease. But until then, faculty need to know how their technology works, and they must have confidence that it will work as planned. Those involved also must know that they are not being replaced by technology. By approaching them from an involvement and learning perspective,

they will understand that human power is what makes technology work. In the educational process, the two work in concert with one another, not in place of one another.

Besides its obvious applications as a teaching tool for addressing multiple learning styles, technology offers countless other applications for improving the overall teaching and learning process. Already, colleges are advancing student assessment and student tracking through technological applications, but compared to industries such as retail and financial services, the education industry's efforts to monitor the progress, decisions, and patterns of its students are progressing in slow motion.

The autonomous nature of traditional education organizational structure has prevented colleges from embracing many of the technological applications that have transformed private industry. Political demands for accountability require college leaders to begin questioning autonomy and tradition with faculty and other internal constituents. The length of time it takes students to reach their educational goal, the amount of student failure community colleges tolerate to maintain open admission policies, the economic and community need for various programs, the skills students have when they enter the work force — these are all issues that community colleges must respond to on behalf of their students before policy makers respond on behalf of their constituents.

Technology provides the ability for colleges to begin seeing each student as a whole person rather than as a schedule of three or four classes. We can see the individual's learning as a multi-year process rather than a set of disconnected semesters. If institutions can overcome functional barriers, they will be able to predict the problems students will have in chemistry, for example, by analyzing the problems they had in mathematics. Technology can then help identify instructional changes that must take place to achieve better results. Such advances will only occur, however, when faculty members see themselves as highly interdependent members of the total process rather than as a single stage of a sequential process. The leader can inspire such thinking by creating situations in which faculty members must work in cross-disciplinary teams (perhaps including other functions such as assessment and academic advising) and then by passing power and decision-making authority directly to these instructional constellations.

Dealing with common educational support issues (such as how the basic classroom should be equipped) is a non-threatening way to bring such teams together; it's also the least threatening to middle level managers, who would be the most likely individuals to terminate momentum before it starts. These teams can then progress to dialogue regarding direct instructional issues (how technology could be applied), and eventually to leadership in setting expectations and learning outcomes (technology's role in process evaluation and process improvement). If the institution can move to this final stage, it will create a future for itself in which the potential for student success is unlimited.

Vision. Strategic planning. Inspiration. Technology doesn't have to be an anxiety source for college leaders. It's just another facet of the same old job. If the institution has a universally held understanding of why it exists and what it expects to be in the future, technology planning is reduced to adapting specific tools and materials to be useful within the overall project. The leader doesn't need to know the difference between RAM and ROM or even have an opinion on the best PC operating platform. Through observation and imagination, the leader needs to see the possibilities of technology and ask how the college can create a strategic advantage through the employment of technology. The leader must create a formal and informal structure within the organization that gives technology users access to technology decisions and gives innovators access to technology resources. The leader must maintain the strategic focus of the technological dialogue. Technological decisions will affect almost every employee. Every employee needs to consider how those decisions will affect students and the learning process. And, finally, if the cost and complexity of technological issues is still a little frightening, remember this: At the current rate of technological advancement, all technological decisions will be completely obsolete in three to five years — even the bad ones.

4 Creating a Learning Culture

Diana G. Oblinger
Academic Programs Manager, Higher Education
IBM North America

One of the most fundamental challenges facing higher education today is the transition from a focus on teaching to a focus on learning — the creation of a learning culture. The implications of creating a learning culture apply not only to students but to faculty, staff, and administrators, as well. Creating a learning culture requires a rethinking of content, processes, organizations, and rewards. For the purposes of our discussion, the term "learning culture" is defined as:

- Instilling in learners a desire to learn
- Teaching learners how to learn
- Facilitating interactions among students, instructors, and information
- Recognizing that learning is a lifelong process.

"What we really need is to develop motivated, skillful, lifelong learners. With knowledge in many fields increasing exponentially, we cannot hope to fill up students as if they were passive, empty vessels." (Berge and Collins, 1994)

Much of the teaching in colleges today is lecture based. Many would describe it as "pouring in content" or "distributing information." According to a California commission on the future of community colleges:

> "On average, instructors spend about eighty percent of their time lecturing to students and one week later students can recall less than one fifth of the lecture material. While lecture methods are appropriate for the delivery of some kinds of information, they are largely incompatible with active learning models for they do not approach instruction as a collaborative learning process between teacher and student." (*Choosing the Future*, California Community Colleges, 1993)

Besides the problem of poor recall, there are other limitations to the current teaching model. It requires students to come to a specific location at a fixed time, but not all students can come to campus at regularly scheduled class hours for the learning they need. In addition, in many states it is becoming obvious that higher education's finite dollars will not stretch far enough to serve all learners using the bricks and mortar model.

"The clear message [is] that the primary learning environment for undergraduate students, the fairly passive lecture/discussion format where faculty talk and most students listen, is contrary to almost every principle of optimal settings for student learning." (Guskin, 1994)

The Future Workplace

It may be more important to look at society's needs than to focus solely on teaching and learning. "What does our society need from Higher Education? It needs a competent and adaptable work force." (Wingspread Group, 1993) To address what society needs from higher education, we must focus on the fact that the learner should be prepared for the future workplace. Experts tell us that it will be a very different workplace from that of earlier generations. Some of the reasons for the changes are:

- The volume of new information is increasing at such a rapid pace that the class of 2000 will be exposed to more new data in a year than their grandparents encountered in a lifetime. Knowledge doubles every seven years. Ten thousand scientific articles are published every day (Forman, 1995).
- Re-skilling is becoming a requirement for workers. To draw on one example from the technology sector, consider the changes brought about by the move from mainframe to client-server applications. Re-skilling a worker in these industries calls for over 350 hours of training and an investment of $50,000 per person (Panepinto, 1994).
- Companies are reengineering themselves, revamping fundamental work processes, resulting in fewer people left to do more things. Being flexible is no longer a way to receive more pay, it a requirement for job security. Overall, there is a mismatch between what education provides and what society and our economy need — a diminishing relationship between what is taught in schools and what is needed in the workplace (Forman, 1995).

Along with these changes, the new economy will have a profound affect on educational institutions. To survive, people will need to develop new skills, requiring colleges to change their orientation. (See Figure 4.1.)

Education and the New Economy

Current Orientation	New Economic Requirements
Facts	Problem solving
Individual effort	Team skills
Passing a test	Learning how to learn
Achieving a grade	Continuous improvement
Individual courses	Interdisciplinary knowledge
Receiving information	Interacting and processing information
Technology separate from learning	Technology integral to learning

Figure 4.1

When community colleges enlist businesses as partners to help build a learning culture, the businesses emphasize the outcomes of learning rather than the inputs of teaching. Businesses require certain competencies, but defining competencies is a difficult task. A starting point is provided by the U.S. Secretary of Education's Commission on Achieving Necessary Skills (1991) where they define the following competencies in the workplace:

- Resources. Allocating time, money, materials, space and staff to complete tasks;
- Interpersonal skills. Working on teams, teaching others, serving customers, leading, negotiating, and working well with people from culturally diverse backgrounds;
- Information. Acquiring and evaluating data, organizing and maintaining files, interpreting and communicating, and using computers to process information;
- Systems. Understanding social, organizational, and technological systems, monitoring and correcting performance and designing or improving systems;
- Technology. Selecting equipment and tools, applying technology to specific tasks, and maintaining and troubleshooting technologies.

The foundation for these competencies requires:

- Basic skills. Reading, writing, mathematics, speaking and listening;
- Thinking skills. Thinking creatively, making decisions, solving problems, seeing things in the mind's eye (visioning), knowing how to learn, and reasoning;
- Personal qualities. Individual responsibility, self-esteem, sociability, self-management, and integrity.

Technology is now a competency that is required in the work force; it is becoming another basic skill. Educators are beginning to identify technology-related competencies our graduates need.

- Knowledge about technology and skill in its use to remain productive and valuable;
- Familiarity and understanding of the role and functions of technology in the world;
- Mastery of technological applications germane to their professions and disciplines;
- Working knowledge of PCs and common software tools;
- Ability to search, retrieve, analyze, and use electronic information; and
- Capacity to use technology independently and collaboratively in their work. (Hall, 1995)

The Allstate Forum on Public Issues recently issued a report called *Labor Force 2000*, which concluded that approximately sixty-five percent of all workers in the United States use some type of information technology in their jobs. And they estimate that this number will increase to ninety-five percent by the year 2000.

The Learner Perspective

If we are to create a learning culture, we must listen to learners. When community colleges ask what students want and need, the list includes:

- Access to information, courses and study material in a time/location independent fashion
- Active involvement and communication with instructors and peers

- A learning environment that takes into account learning style, preparation and speed
- Experiences that provide an edge in the job market.

Based on what students say and what we know about how people learn, the components of an ideal learning environment — the components of a learning culture — include:

- Independent learning and access to information
- Review and practice, on demand
- Access to material from home or campus
- Work with real-world problems and complex issues
- Communication, collaboration, and interaction.

Reengineering the Learning Environment

Creating a learning culture will require significant change in the instructional strategies of community colleges. The critical questions to ask include:

- Who do we serve?
- Why do we do what we do?
- What must we do?
- What should we do?

Who do we serve? Ultimately, community colleges serve society and their local communities. More directly, they serve learners. If this philosophy is adopted, there are significant implications for education. Rather than the current institutional organization, the implication is that institutions will place the learner at the center. (See Figure 4.2.)

Why do we do what we do? There are multiple answers to this question. Because that is how we were taught. Because the culture of higher education emphasizes independence. The tradition, the existing infrastructure, the lecture-based experience of faculty, and the fact that it is more comfortable to preserve the status quo than to change — all contribute to higher education's lecture-based approach to learning.

What must we do? What should we do? These are the tough questions. Although there are no specific answers that apply to all institutions, a basic tenet is that colleges will move from a faculty-centered to a learner-centered approach. "Faculty and their interests dominate the teaching infrastructure. Design all too frequently begins with the question "What do I want to teach?" rather than "What do students need to learn?" (Twigg, 1994)

The Changing Focus: Learning Environments

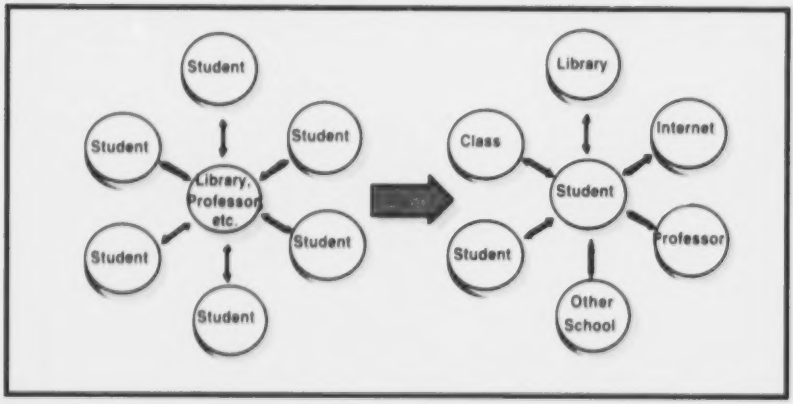

Figure 4.2

Learners are the primary audience and preparation for lifelong learning—as a part of a productive work force—is the goal. Developing a new model for what community colleges must do and should do requires a new conceptual framework. In developing this framework, there are four factors to take into account: cognition, collaboration, communication, and computing.

Cognition. In recent decades, science has discovered much about cognition, the way students learn, and the obstacles they face when learning. In spite of this, cognition has been only minimally incorporated into our present educational system.

Collaboration. Increasingly we are defining the learning experience by the interactions we want to encourage. This can include interaction with information, interaction with other students, and interaction with the instructor.

Communication. Today's students and educators have access to powerful communication tools.

Computing. Students must be familiar with technology and its uses as part of everyday life and work. In addition, technology is an enabler of the transformation of learning.

In creating a learning culture there should be a transformation in the role of the instructor, the concept of place, and the concept of time. In a transformed learning environment, the instructor has a new role: the designer of the learning environment, a coach, or a guide. Place need no longer be restricted to the classroom; it may be extended to the virtual classroom or a virtual environment in which learning takes place. Time can become a variable instead of a constant as in the 50-minute lecture. In a transformed learning environment, the course entry point may vary based on student preparation. The exit point may change depending on the depth of mastery required. The length of the learning activity may be expanded or contracted to fit the learner's schedule and educational goals.

Alternative Educational Model

Lecture Model	Alternative Model	Technology Implications
Classroom lectures	Individual exploration	Networked PCs with access to information
Passive absorption	Apprenticeship	Requires skills development and simulations
Individual work	Team learning	Benefits from collaborative tools and e-mail
Omniscient teacher	Teacher as guide	Relies on access to experts over network
Stable content	Fast-changing content	Requires networks and publishing tools
Homogeneity	Diversity	Requires a variety of access tools and methods

Figure 4.3

"We are in the process of shifting what it means to be literate from the memory base of knowledge acquisition to knowing how to find and use channels of information. Knowing how to learn is more important than the facts accumulated." (Adams, Carlson and Hamm, 1990) This shift carries with it technology implications shown in Figure 4.3 from Bourne, Broderson, Campbell, and Dawant (1995).

Inhibitors to Change

Community colleges can take action to ensure that learning cultures are encouraged on their campuses, but every institution will face inhibitors to change. Three primary inhibitors are: culture, faculty, and environment.

Culture. This is where the most resistance to change is found. On most campuses there is a tremendous regard for tradition. Change is actually feared. Since technology represents change, it, too, is often feared. The assumption should not be made that the use of technology is value free. Experience shows that technology is not perceived as neutral (Hodas, 1993).

Incorporating technology into the learning environment carries cultural implications. "The computer is a symbol of a new way of life. It represents a 'disconnect' many educators feel between their background and training and the current needs of society. The digital medium redefines the dynamics of teaching and learning." (Noblitt, 1995) Perhaps a more insidious inhibitor to change is the belief that the current teaching culture does not reward novel approaches using technology.

The student culture may inhibit change, as well. There is peer pressure among today's students not to learn. Where this pressure is combined with the students' own fear of failure, we have a culture that is much more likely to stay with the existing teaching paradigm rather than move to a learning culture.

Faculty. Faculty have established teaching methods and styles. If the focus is to be on learning rather than teaching, these methods will have to change considerably. Technology, as part of the change, is often considered an impediment. On most campuses there is insufficient training to help faculty assimilate technology into a learner-centered approach. The result is that faculty are often resistant to any change which requires them to incorporate tools with which they are unfamiliar and uncomfortable. "The anxiety of [instructors] to technology is a resistance to the

revisioning of the values and purposes of [education] itself. It is about self-definition." (Hodas, 1993)

Environment. Inhibitors in this category include the physical environment as well as the fiscal environment. Older classrooms, the lack of technology, and an infrastructure to support it are inhibitors to creating a learning culture. Financial constraints limit the amount of training available for faculty. In addition, the inability to replace faculty as they retire may limit the rate at which the institution can change.

Other inhibitors to the development of a learning culture, in priority order, are:

- Lack of leadership
- Reduced budgets and high costs of change
- Poorly motivated students who fear failure
- Poor communication skills
- Poor organizational structure
- Outdated content
- Consensus on the components necessary for a learning culture
- Limited access to information databases
- Unwillingness on the part of administrators, faculty, and students to change.

An action list which includes five approaches to overcoming cultural obstacles was developed at the Presidents' Forum. Colleges can:

- Create a non-threatening environment, one in which students experience learning through a team-based approach.
- Shift funds to what is valued. If team-based learning is desired, for example, then reward this learning approach.
- Make education more relevant by linking learning to careers.
- Encourage K-12 schools to adopt a learning model.
- Hire faculty who embrace the new learning culture.

Faculty are very responsive to encouragement from college leaders. With support for in-service training and incentives for taking this new approach to learning, the faculty could become strong advocates for the new learning culture.

To overcome the environmental obstacles, technology can be used to remove the constraints of time and place. Community businesses should be considered as partners in assisting with enhancements to the infrastructure.

Leadership Challenges

The creation of a learning culture and the infusion of technology across the curriculum is an "act now" issue. Because faculty are often not ready to participate in a technology initiative, strong campus leadership is needed.

Some of the challenges facing community college leaders include:

Budget. Providing the infrastructure and support needed for a learning environment will require significant funding. According to Green (1995), "The movement toward the information/knowledge economy of the 21st century highlights the need for colleges to invest in and maintain the technology resources needed by students and faculty. But we're not going about it well—or right. Colleges and academic departments cannot build or maintain a technological infrastructure on year-end funds or 'budget dust.'"

Green and Gilbert (1995) note that the level of investment in user support (personnel and dollars) often runs at one-half to one-fifth of recommended levels when compared to widely cited standards for corporations. In addition to an insufficient level of support, only one-fifth of the nation's colleges have a capitalization or amortization plan for their computer purchases (Green, 1995).

Part of the funding problem may be due to not recognizing technology as a critical infrastructure necessary to support the learning environment. "We must find our way out of the tar pit of justifying technology applications because they demonstrate tangible cost savings and into the integration of technology because it significantly improves the learning process." (Heterick, 1991)

Infrastructure and Support. Few campuses have adequate resources to support the use of technology in the curriculum. The support required can be enormous. It begins with the need for a ubiquitous infrastructure — networks, servers, dial-in ports, and personal computers. If a common infrastructure and a baseline of technological skill can be assumed, new learning strategies can be deployed.

Support should include access to education and training in technology, but also in instructional design, cognition, collaborative learning, and other areas related to understanding how people learn. According to Gibbs (1995), few faculty have any knowledge of the literature about learning. As teachers, he says we are amateurs. "Even the best TA training in the United States represents a tiny fraction of the master's and Ph.D. research training that postgraduates have undergone."

Faculty development. With the incorporation of technology into the classroom, faculty can no longer limit their role to that of content expert. To capitalize on the educational potential of technology, three additional skills are required beyond the content expertise of existing faculty: instructional design, application design, and technical implementation. These skills need to be supplied by institutional support systems or by the faculty themselves. Faculty development will be critical in developing these skills since most faculty have not had reason to develop these capabilities previously (Resmer, Mingle and Oblinger, 1995).

Pedagogical changes. Educators and policy leaders are envisioning a new approach to instruction based on communications and computer technology. Continuing education, adult learning, and on-the-job training increasingly involve two new modes of delivery and learning: learning-on-demand and learner centered instruction. Our current model of education is bound by time, place, and institution. Technology can free us from these constraints. Most institutions have yet to take advantage of these new freedoms.

It is possible to create learning environments focused directly on activities that enhance student learning. However, the process will require that we restructure the role of the faculty to maximize essential faculty-student interaction, integrate new technologies fully into student learning processes and enhance student learning through peer interaction. "Students will spend more time learning by themselves and with their peers and much more time engaged with powerful, interactive technologies, and will spend less actual time—but more creative, intensive, and focused time—with faculty members." (Guskin, 1994)

Structural change/reorganization. Creating a learning culture using technology has implications for how institutions organize their resources. Historically, organizations have revolved around a technology: books belong to the library; television-

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based programs belong to the AV department. This technology specific approach is less viable in an environment where many media are in digital format and user service is the dominant role. Organizational structures that do not facilitate a mixing of technologies will find it difficult to reach their full potential in this new environment (Miller, 1992).

The relationships among institutions may change, as well. At the end of the 1970s, institutions generally acted individually. They created their own courses or purchased materials from other institutions. In the 1980s institutions formed consortia designed to share the cost of course development and delivery. Miller (1992) predicts that as the 1990s unfold, there will be innovations in institution-to-institution relationships — the most visible being the networked open college. For the first time, we are seeing the emergence of national institutions that attract their students from around the country. Several organizations are exploring how to extend the national college to a global scale.

Executive leadership. Without strong executive leadership an institutional initiative to create a learning culture will fail. Developing clear, consistent messages that help the institution establish its priorities and processes is critical. Listening to and enlisting assistance from external constituencies will be among the roles of the institution's executives. Leaders must assume the task of channeling faculty efforts toward common goals.

Conclusion

One of the dominant themes in community colleges in the next decade will be creating a learning culture. Historically, community colleges have been highly responsive to the needs of their learners and their communities. For this trend to continue, we will need strong executive leadership and the appropriate use of technology to solve educational problems. If we listen to learners, use what we know about cognition, collaboration, communication, and computing, we will better serve both learners and society.

5 Implementing and Analyzing Operations in Higher Education

Sunil Chand
Executive Vice President,
Academic and Student Affairs
Cuyahoga Community College

Introduction

The key word in discussions on higher education today is "change." The system is far more complex and highly invested than it has ever been, requiring management equally complex and refined. The environment presses upon colleges as it never has before, requiring them to deal with pressures they believed reserved for the worlds of commerce and politics. The academy, protected through its special mission and replete with traditional privileges, is open to public scrutiny and increasingly permeable to the demands and opportunities of life outside its walls. These are the themes of conferences, journals, and convocations. They are also among the primary agendas of political and legislative bodies and the councils of business and industry, all of whom seek to influence and direct higher education as social institutions. The power of the customer is what renders these pressures ultimately irresistible and higher education faces conditions not of its making or in its control. It has lost some of its options.

Primary amongst the options it has lost is whether or not to invest in the new information technologies. It is not now a question of whether to do so, but a question of how, when, and to what extent. The challenge is to deal with this reality in a constructive and developmental fashion that stays true to the primary mission of higher education. To do so, colleges must be intentional in their adoption and use of the technologies even if they cannot control the pace of their development and dimensions of deployment. Institutions must be analytical in their implementation strategies and deliberate in their operations. The costs of technology in terms of effort and monies are enormous, and the impact should be commensurate. Therefore colleges should set high expectations and gain the full value of the promise of

technology in developing a high performance workplace, improving productivity in teaching and learning, lowering operational costs, increasing customer responsiveness and personalized attention, and demonstrating accountability to all stakeholders.

Implementation

Implementation begins with the determination to deploy information technologies. Deployment in higher education usually proceeds inductively. Early adopters in various academic and administrative departments convert to technology and begin to shape the institution's understanding of its use. They are the ones who subsequently are asked to serve on planning committees, to advise others on adoption, and to train colleagues. They provide a useful internal resource but also represent special interests in choices affecting hardware, software, and systems, often strongly. Further, their work usually proceeds in the absence of any overarching plan for technology at an institution. A common consequence is the proliferation of diverse operating systems and hardware rather than consolidation of resource allocation.

Trustee Involvement

Recognizing the value of early adopters, institutional leaders must also accept that the complexities and costs of technology deployment today demand a more deductive approach that establishes principles before practice. Such an approach begins with commitment and expectations declared at the highest level. There is no substitute for a technology policy established by trustees. The approach should be broad enough to encompass academic and administrative aspects, i.e., it needs to be institutional in scope, but specific enough to direct operational development. Major items of such a policy include guidance to the college on the commitment to use technologies, the standardization of platforms, the principles regarding networks and access, the safeguards concerning privacy, appropriate use, copyright and security, the directions regarding software, including the limits of support and ownership, the levels of authority for decisions regarding deployment and, perhaps most important, the expectations of trustees regarding the benefits expected.

While such a policy charts the course for operations, it also encourages and allows trustees to deal directly with those aspects of operations that have strategic significance and thus prepares them for the decisions that will follow. The human effort required in training and deployment must be appreciated at this level. The costs, which are enormous and which demand much more exacting accounting and

strategic planning practices, need to be understood. The pace of technology development makes equipment, software, training, and support services outdated, if not obsolete, within the service period of any single trustee. Furthermore, technology demands as much investment over time as it does initially. This fact must be faced at the onset. The development of a policy requires that these issues be discussed, so that trustees and the institution are prepared for future commitments.

Leadership Roles

Closely following action by trustees in importance is the direction set by leadership. This has two aspects, leadership by example and leadership through planning. The first is multifaceted. Examples abound of faculty and administrative leaders who use communications technology regularly and espouse it publicly. Some go beyond and develop expertise in specific applications which they use in decision making, communication, teaching, and management. Increasing their effectiveness, a few then attract resources for their work groups and begin to develop cells of innovation and high performance that become models for their institutions. They prepare true learning cells within their organizations. The impact of such examples cannot be overstated.

On the other hand, equal examples abound of leaders who prefer not to have their time and attention attenuated by the demands of information systems that overload screens with unsorted messages and uninvited information. They work strategically, leading and controlling through a focus on mission, delegation, and evaluation rather than direct communication. For them, technology deployment becomes a piece of the mission. Presented in this way, it gains great significance in planning and activity at all levels, with innovation in application occurring at the user workstation.

Technology Planning

Leaders, of course, appear all over the continuum. No matter where they appear, however, it is their responsibility to direct the development of technology adoption plans at their respective levels of responsibility. At the highest level, this plan begins with the college's mission and strategic plan. It is the purpose of the technology plan to create a vision for how technology will express the college's mission and vision through technology. In other words, visioning exercises should be conducted and focused on technology and its possible role and impact on the institution. With this

vision as a guide, the plan should then set expectations that are realistic regarding the applications of technology within the parameters of the college plan.

Priorities thereby identified need to be consistent with those of the larger plan and expenditures developed in a manner consistent with institutional fiscal forecasts. In some cases, this will mean adjusting priorities for cost-effectiveness dictated by the large shift in resource allocation that will be necessary. Timelines need to be included for all phases of adoption, including financing, hardware, software, facilities, networks, training, support, and upgrades. If major system migrations are included, they need to be projected and prepared for detailed project planning. Finally, the plan should include measures to evaluate progress, adjust activities, and forecast new directions.

In college settings, it is necessary to focus the plan separately on both academic and administrative applications, and to seek commonalities wherever possible. Commonalities will permit consolidation of resources for acquisition, deployment, training, and support. Differences must, however, be acknowledged and agreement established regarding the parameters of difference. No technology plan should be open-ended on this question.

Assessment

A key component of any planning process is the assessment that establishes a college's baseline in terms of technology deployment. This assessment is best conducted at the outset. The applications of technology at colleges typically grow inductively in an entrepreneurial fashion. Investment, capacity, operations, activity, and expertise develop in nodes that are rarely networked or shared. Over time, an institution develops substantial capacities, but is most often unconscious of its own potential. This is where assessment adds value. A college should prepare an audit of each workstation, all software, operating systems, networks, functional capacities, locations, licenses, and documentation. The audit should accompany a human resource review, including students, to determine the level of training, access, and adoption at the college, home, and workplace. Following this should be an assessment of need gleaned from all constituent groups, to include curricular issues, access, academic support services, management and office functions, and student services.

From such an assessment, a local gap analysis should be prepared which can inform planners of priorities. A college wishing to implement information technology as a central mechanism should also test its local gap analysis against national peers in order to develop benchmarks which will give planners goals. In this context it becomes most useful to extend benchmark analysis outside the academy to discover best practices in customer service, information processing and delivery, program delivery, and workplace performance enhancement in order to explore systems and analogies that may be adapted for institutional purposes. GIS mapping, the management of credit accounts, the recording and management of patient data, ATM operations, and remote reservation systems, for example, offer instructive examples for marketing, financial aid, admission and records, business office, and registration operations.

Once the plan is developed, preferably with the involvement of primary stakeholders, it needs to be publicized widely, to promote accountability, limit the extent of entrepreneurial growth, and facilitate control over resource allocation. Promotion of the plan also increases awareness at all levels of the organization, from trustees to the campus and external communities. This is an important responsibility of the leader. Dissemination also encourages discussion based on the published facts. Finally, a well-communicated plan demonstrates the commitment of the leadership to all stakeholders and smooths the way to operations. It does so by indicating directions to all levels of the organization and by suggesting, within the strategic framework, annual and achievable operational goals.

Operations

Proper planning defines operations; operations are directed to the achievement of objectives. Analytically, one can approach operations in various ways. A common approach is through management units. Academic affairs, for example, is often concerned with issues of preferred platforms, software appropriate to the specific curriculum and to the predilections of faculty, the mix of open and dedicated facilities, changes to pedagogy, workload, examination and grading practices, scheduling and class management, and enhancements to academic support services, including electronic information access for research and tutoring.

The student services area adds other considerations: enrollment and retention management through integrated and relational data bases offering convenience,

efficiency, and accuracy in admissions; registration, fee payment, and access to services such as financial aid and housing; independent access by faculty and students to student records appropriate for academic advising and enhancements to teaching and learning; documentation of extra- and co-curricular activities; and establishment of longitudinal tracking systems to facilitate studies of progress and retention, graduate and employer follow-up, and alumni development. All of these services can be integrated into larger systems for studies of outcomes assessment and institutional effectiveness.

On the administrative side, the demands of financial and human resource management systems are primary. Closely allied are those of institutional research and planning, resource development, and marketing. The goal here should be to integrate services into a single management information system with appropriate security systems, flexible enough to permit needed reports on demand and facilitate the ability of managers to plan, direct, and evaluate activities.

Such a list of operations could grow quickly and will vary by type of institution, determined in each case by the institution's mission and plan. Development of the college's human resources, adequate funding, and continual evaluation will contribute to the success of all operations in any context.

Human Resources

Paradoxically, even as the adoption of information technologies is not commonly the natural or preferred choice of employees, any successful deployment is absolutely dependent upon their acceptance and use of the new systems. Institutions must recognize this paradox and construct human resource programs to deal with it. The adoption of technology — which is complex and expensive — is always attended by increased levels of employee anxiety and stress. The technologies themselves are often unfamiliar — from equipment, and protocols to capacities, functions and terminology. The power and intricacy of recent systems are in themselves intimidating and the learning curve required often threatening. Most of all, personnel — especially academics — deeply suspect that adopting the technologies will force radical alterations to their established patterns of work and lessen their control without commensurate improvements to outcomes. Somehow, they fear technology will take over. On the other hand, these same personnel expect to see little change in the support, recognition, and reward systems affecting their work, security, and

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promotions even if they do adopt new systems. All this points to the need to establish new faculty and staff development opportunities and fresh incentives in order to encourage change and reap its benefits.

Development programs could include mini-grants specifically designated for technology integration, encouragement of sabbatical applications in this area, support for conferences and other networking opportunities through funding especially earmarked for the purpose, awards for innovations using technology, and the establishment of technology training centers. A focus on early adopters as leaders of cells is effective in beginning stages, as peer example is invaluable. Incentives may also include training on institutional time, communication of effective practices, networking, and encouragement.

Managers should encourage staff to solve problems through experiment and even risk with the technology, for it is both rewarding and forgiving in response. Enhancements such as network software, forms and formatting programs, imaging systems, fax capability at the desktop, and so on should be supported. Conversely, encouraging competence with such enhancements allows managers to expect improved performance, which itself is an incentive for employees. A good example for faculty is support for attendance at conferences on technology where they can showcase and share their own experience and expertise. Tenure policies that reflect competence with information technologies as a component may also be incentives to use technology.

Institutions will also need to deal soon with alterations to working conditions. Already, telecommuting is standard in many industries, as is accountability measured by performance, not by seat time in an office. Higher education has been slow to accept such changes. Traditional work units such as the lecture hour equivalent, class size, student contact hours per week, the standard academic term, office hours, and even the course, will be redefined as more instruction is delivered using technology. Colleges advanced in distance education know this already, but fundamental change is yet to come and probably will not occur until it is supported by an entire system, from state coordinating board to individual college. In this regard, it is especially encouraging to note the increasing number of states that have developed comprehensive plans for deploying technology in education.

Costs

Much has been said about the importance of planning for the costs of technology deployment. Strategically, the major shift that technology requires in planning is providing for both immediate and recurring costs of system and personnel support. Institutions must recognize that a commitment to technology today is automatically a commitment to upgrading and even replacing it tomorrow. This is difficult for educational institutions to accept, from trustees to administrators and faculty. Those who expect and even demand it are our students; for them the issue becomes cost sharing.

Long term commitments that are familiar and even beloved of colleges are grounds, facilities, and libraries. For these, there are plans for regular maintenance and enhancement, even though all are also often early targets of deferred expenditures. Technology forces different financial realities. Once adopted, technology becomes not a part of the environment, but an integral part of the programming and operations. Its maintenance and enhancement cannot be deferred. The fact that enhancement is not solely in the control of the institution complicates the matter. The rate at which new technology is developed is often a determining factor. The situation is no different in principle, though much greater in effect, than that faced by students in the development and marketing of textbooks. The customer is not in control and has few options beyond careful planning and little hope of cost recovery in the long term. This situation does, however, encourage innovation. Institutions are already seeking alternative ways to fund technology deployment. These include a range, from levies to bonds, from cost sharing with state agencies to partnerships with other educational institutions and businesses, from donations and special grants to cost sharing with faculty, staff, students, and even alumni through special financial arrangements. On the human resource side, job descriptions and classifications should be scrutinized to include and reward skills in information technology. Retraining and cross training should be required to upgrade skills and career paths. Some institutions are already requiring technology skills as hiring and promotion criteria, the payoff being higher performance and increased employee job satisfaction. Diverse models are emerging, tailored to particular circumstances. Common to the most successful, however, are plans for implementation and operation that specify expectations and allow for evaluation of effectiveness.

Evaluation and Accountability

The final operational necessity is a system to evaluate the effectiveness of the investment. This, of course, hearkens back to the mission, vision, and expectations set in the first place. What is becoming increasingly clear, however, is that the adoption of information technologies will add only minimal value to operations unless the fundamental processes of the institution are altered to take full value of the enhancements. TQM has taught the importance and credibility of process improvement. Technology offers the promise of complete reengineering. Indeed, without reengineering, technology offers little than a more expensive and more convenient way of carrying out existing operations. Even at this level one should be able to document a reduction in time taken for tasks, an improvement in accuracy and presentation quality, and an increase in the availability of information — all of which should result in increased productivity and higher quality.

But change commensurate with the scale of investment will only occur when processes are reengineered. The greatest promise is the creation of truly student-centered educational environments. An example is the projection of the paperless registrar's office, with all student transactions being controlled and conducted by the student directly through electronic means, from initial registration to the forwarding of transcripts directly to the next institution. When this happens the locus of control is transferred from the institution to the client, along with a concomitant personalization of service, or "mass customization," a movement that has already matured in the world outside the academy. A significant consequence for colleges will be the redeployment of their expert and increasingly expensive and precious human resources away from routine operations to points of major influence and intervention, where they can make the most difference for their students. It is at this point that the evaluation of and accountability for the investments will be most meaningful.

Conclusion

It is clear that the new information technologies are with colleges to stay and that they have little room to refuse them. The productive approach is to adopt them intentionally and deliberately, controlling as much of their costs as possible and taking full advantage of the opportunities they afford. Adoption will best be done in partnership with other agencies, constituencies and stakeholders, and will require careful and on-going planning and evaluation conducted in concert with the

institution's larger strategies and assessments of effectiveness. It will also require a shift in thinking about investments to include both immediate and long-term commitments, and commitments to support and training that may be as large as those to hardware and software. Finally, it will require setting high expectations in terms of a return on investment through the development of high performance institutions focused on learning and moving students through the system as smoothly as possible. The order stands tall.

6 Using Information Technology to Enable Transformation

Darlene J. Burnett
Consultant, Higher Education
IBM North America

"Even though change challenges all community college stakeholders, there is no viable choice but to move as soon as possible to a student-centered environment."

—Phillip M. Summers
President, Vincennes University

The term student-centered environment has had different meanings over the years. During our country's agrarian years, student-centered environment referred to a schoolhouse, where a teacher skilled in reading, writing, and arithmetic used chalk and slate boards to impart knowledge to young students. The school schedule met the needs of the local lifestyle, which generally meant that it was closed during harvesting periods. What students learned was sufficient for their entire working lives.

When the nation's economy became more industrial, a student-centered environment still included the schoolhouse concept, but the student population was typically a little older. Additional subjects were added and students could take their books home with them. Many of the required job skills were learned on the job and both the job and the skills necessary to perform it remained constant for life.

As the information economy evolved, the use of technology became prevalent in most work situations. Computers were everywhere, constantly changing and accelerating the need to learn new job skills. Lifelong learning became a requirement for survival.

Now, as we move from the information economy to the knowledge economy, students demand the technological skills they know they will need to survive in the changing society in which they live. To meet this demand, higher education institutions must implement the student-centered environment.

This new definition must include access to information in new and convenient ways. Gone are the structure and schedules established during the agrarian and industrial economies. They no longer apply to the knowledge economy. Higher education must provide services and support and learning that fit today's lifestyles and the new lifelong learner. This means that access to information, services, and learning must be time and location independent. The focus of delivery must be on the student — the customer. Technology will provide the tools to help community colleges create this new student-centered environment, but delivery processes and philosophies will have to expand to integrate these tools into the system. The key word is *service* and the concept is *student for life*.

Supporting the Lifelong Learner

Colleges will need to examine internal institutional policies and procedures to make them more flexible and responsive to the needs of their customers. Those colleges that place a high value on services designed to enhance student success and to meet community and lifestyle needs will become models for other institutions of higher education.

In "The Enabling Role of Information Technology," a chapter authors Michael Hammer and James Champy contributed to *Reengineering the Corporation*, they state that, "The fundamental error that most companies commit when they look at technology is to view it through the lens of their existing processes. They ask, 'How can we use these new technological capabilities to enhance or streamline or improve what we are already doing?' Instead, they should be asking, 'How can we use technology to allow us to do things that we are not already doing?' It should be clear ... that further advances in technology will break more rules about how we conduct business. Rules that still appear inviolate today may become obsolete in a year or less. Consequently, exploiting the potential for technologies to change a company's business process and move it dramatically ahead of its competitors is not a one-time event."

Planning for, implementing, and supporting the integration of technology within institutional missions is a complex endeavor that requires careful consideration and change. Change is rarely easy, but the ability to change is critical for those colleges that want to provide the service environment necessary to support the lifelong learner.

The Community College Environment

The environment in which community colleges exist today is one of extraordinary amounts of data and information. The majority of this information is passed from staff to student, faculty to student, and data interpreter (report builders) to staff and faculty. Students, staff, and faculty all want the ability to access information themselves at a time and location that is convenient. This direct-access method of information retrieval is more in keeping with our knowledge-based society and more supportive of the lifelong learners who now come from many different parts of society.

As institutions prepare their students to meet the challenges of the global economy and work with their communities for economic development, they are constrained by financial pressures. Added to this mix are the complexities of accelerating technological change. The environment is one which demands quick response, efficiency, effectiveness, and cost-conscious solutions — certainly not an easy combination for sometimes seemingly conflicting needs.

Technology as a Catalyst for Transformation

As colleges focus on transforming themselves, it helps to have a catalyst to bring all participants at the college together to support, plan, and implement successful changes. All too often the rallying point for the college is a crisis that causes everyone to agree that things must change. All too often the crisis is financial. Using technology to enable transformation can create a positive rallying point and help provide the physical focus. The identification of a technology that supports a new process can help stimulate the creativity needed to find new and better ways to deliver services and learning.

Joseph J. Bulmer, president of Hudson Valley Community College, noted that, "Students should be at the center of our educational universe and technology can assist us in enlarging this universe of opportunities." Bulmer's view is

representative of the approach many community colleges are taking to bring about the transformation to a student-centered campus.

At the heart of the transformation, several paradigm shifts must take place. In information access, from staff-centered to student-centered; in instruction, from teacher-centered to learner-centered; in administrative services, from institution-centered to customer-centered. Many of the processes used to support these areas were not designed so much as they evolved in response to the requirements of the day. With the increasing complexity of higher education offerings, administrative requirements and customer needs led colleges to add layer upon layer of ad hoc processes and large support infrastructures. To complicate matters further, many of these processes were created when technology was not available or capable of making the processes more user friendly, effective, or efficient. Now, it is critical that these processes be redesigned to gain the efficiency, effectiveness, and cost benefits the technologies offer. When processes are not evaluated or altered prior to adding technology, the technology will become just an additional expense and the full benefit of the technology will not be felt. By reviewing the processes and adding the technology catalyst, institutions can move toward an improvement in competitiveness, and improved learning. According to Hammer and Champy, "...the real power of technology is not that it can make the old processes work better, but that it enables organizations to break old rules and create new ways of working — that is, to reengineer."

Applying Technology

To use technology as the catalyst for change, several elements should be present. First, the college vision should be clearly stated and a technology catalyst selected. As various technology catalysts are considered, the selection must meet the following criteria:

- It must help fulfill the college vision.
- It must help execute the college mission.
- It must help achieve a college objective.

Next the processes associated with the change need to be evaluated and redesigned as appropriate. As the strategic and tactical plans are created for implementation, several questions should be addressed:

- What policies need to be changed?
- What are the critical success factors?
- What is the impact on the college?
- What is the impact on the faculty, staff, students, and community?
- What support and training will be necessary?
- What is the relationship between cost and benefit?

Critical to any successful change involving technology is ensuring that the infrastructure requirements necessary to support the desired outcomes are in place. To create a true student-centered environment, college leaders must provide access to existing information for a new set of users that includes students, faculty, and the community. It is imperative that an integrated information infrastructure be provided for the network. To do this, college leaders must change key paradigms, transform processes, leverage investments in technology, and select technology catalysts.

Barriers to the Creation of a Student-Centered Environment

A student-centered environment is a natural fit with the philosophy of community colleges; it is on community college campuses where transformation will occur first in the educational hierarchy.

There are significant barriers, however, to creating a student-centered environment. They include: tradition and resistance to change, cost, control, leadership, planning, students, training, and institutional and environmental turbulence. Tradition and resistance head the list of barriers, as they often do. Simply put, people are usually comfortable with the familiar, and community colleges are no different from the rest of society in this aspect. Community colleges do function, however, in a faster-moving climate than most institutions of higher education. Under strong leadership which promotes risk taking, and guided by a clearly articulated vision, individuals can be encouraged to embrace change. A clear direction, supported by the CEO, combined with a foundation of training for the faculty and staff, will overcome resistance to change. Team building and communication are critical during this process. Success relies on sharing information, including individuals from all groups, and forming brainstorming groups. A college can demonstrate its support further by rewarding those groups and individuals who contribute to changes.

Cost is another barrier always found at the top of the list. But there are several ways to overcome the cost barrier: legislative assistance, reallocation of budget line items, a technology capital campaign, institution of special technology fees, and moving technology from the capital expense category to an operational expense. When a life-cycle plan is implemented some of the cost barriers simply fall away.

Control barriers may be more difficult. An administration unwilling to consider change or internal and external politics may be the two most difficult barriers to eliminate because they are so insidious. In some cases, it is the "we know best what the student needs" attitude; in others it may be local, state, and federal policies that limit options. Without an institutional vision supported by the CEO, this type of barrier may be too formidable for a staff to overcome. Distribution of a monograph such as this one may be the most positive approach because it clearly discusses what the chiefs of other institutions are doing.

The lack of an institutional plan for the use of technology provides fertile ground for confusion and poor institutional focus. In many cases, this is complicated further by an absence of skills and direction in creating the plan. To break down this barrier calls for commitment by top administrators and change-secure faculty and staff to plan for the future of the institution. Guided by the college's mission statement and, hopefully, with the help of trained technology experts, this planning team can effectively outline a three-year plan for how technology will benefit the college.

On a different note, institutional turbulence can be a barrier to creating a student-centered environment where faculty and student turnover are reflective of the community. Marcia V. Keizs, former acting president, Borough of Manhattan Community College, points out that, "A major factor inhibiting a student-centered learning environment is the result of institutional turbulence. There are many institutions in prolonged periods of anxiety and stress and this inhibits real action."

Conclusion

Over the last twenty years, higher education has been swept up in the whirlwind of change. The face of the student population has changed to include women, minorities, and all ages of people with all types of career and learning aspirations beyond what our traditional educational institutions are prepared to deliver. The community colleges that pull their human, financial, and technological resources together to transform their campuses into student-centered environments will find themselves at the center of a transformation that will mark the 21st century and provide these students with learning support for life.

7 Planning to Take Advantage of Technology

Gary E. Wenger
Executive Director
Computing & Information Systems
College of DuPage

It is the role of technology leaders to plan for the seamless universe of today's enterprise computing environments. Today and in the future, information technology (IT) will play a strategic role in the way colleges do business. It is very important for colleges to be leaders in information technology in their own operation as well as teach the use of current technology to their students because IT is changing the learning and teaching process and will continue to affect the day to day operation. Planning is a critical component of success in implementing technology to keep pace with the information needs of students, faculty, and staff. Key to planning is understanding the real issues underlying technological integration and the impact that these issues have on the institution.

The proliferation of technology in all aspects of a college's operation means that technology is a larger part of an institution's budget, even while current investments are growing older and often need to be updated to use newer applications. Colleges are under pressure to offer more for less and improve the quality along the way. What was once a competitive advantage of added value becomes a base application when a college misses the technology window of opportunity.

Issues

There are several internal issues and external trends that will impact the direction of community colleges. The major internal issues deal with the management of growth, changing educational characteristics of students, allocation of resources, maintenance of technology, and communications. The major external trends are changing demographics, limited funding, the rapid rate of technology change, increased demands for convenient services, and competition from other education providers.

Institutional Commitment

Success or failure in using information technology will be determined by the degree of institutional commitment provided by the board, president, and the various constituent groups in the college. Implementing and supporting information technology has such financial implications on campuses that the absence of commitment by senior management ultimately means failure. Commitment and support is required for successful implementation and use, and that commitment starts with planning for the future.

Information Technology: Definition

Information technology consists of activities on campus which use technology in the distribution of information and incur capital, operating, and human costs. The traditional activities include student computing, faculty computing, administrative computing, and central computing. Over the last several years additional areas have been added. Principal areas are defined as follows:

- Student computing is the use of computing technology for learning by students. This includes open computing labs and classroom labs.

- Faculty computing is the use of computing technology in the support of instruction and classroom management. This includes all the faculty computing labs and individual workstations.

- Administrative computing is the use of computing technology to support the daily activities for the college's operational processes. This includes the student system, financial system, human resource system, library system, etc.

- Central computing includes the computer systems and networks that centrally support automated instructional and administrative processes for faculty, students, and staff at the college. This may include both mainframe and personal computers.

- Cabling infrastructure provides the delivery method used for voice, video, and data services across the institution, including telephone communications, personal computers on networks, and the delivery of televised instruction in the community college district.

- Telecommunications includes telephone instruments and voice mail services.

In order to plan for using information technology, all of these areas must be considered, and all user groups included.

Planning Methodology

The College of DuPage uses a simple approach to determine the planning methodology. There are seven basic questions that need to be answered in order to properly plan for the future.

- Where are we?
- Where do we want to go?
- How do we get there?
- When will it be done?
- Who will be responsible?
- How much will it cost?
- How do we measure the outcome?

Planning Process

A formal planning process must be defined to provide definition and direction when planning for information technology. The information technology plan should be one component in a college-wide process for institutional planning. The information technology plan should be driven by the college vision, mission, and institutional goals. It must be an integral part of other supporting plans such as an educational plan, financial plan, facilities plan, and human resource plan. The information technology plan must work together with these plans and provide a clear view of the future technology, the impact on current resources, and the estimated cost for future implementation. Figure 7.1 shows the College of DuPage's planning process. Integral to any successful planning process is the involvement by all the IT stakeholders, i.e., community, faculty, staff, and students.

Surveys and interviews with each department, information technology forums with each constituent group, and a formal committee structure should be set up to be involved in planning for information technology. The formal committees should

collect data, review, summarize, and prioritize recommendations to generate a comprehensive document that will satisfy most of the major administrative and academic issues relating to information technology.

Planning Process Model

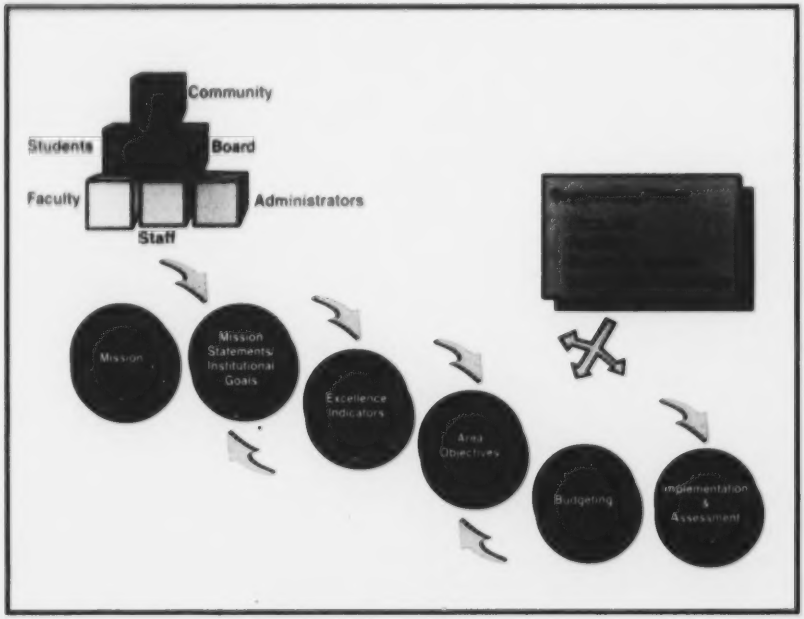

Figure 7.1

IT Planning Cycle

A planning cycle or sequence of events must be defined. At the College of DuPage, the information technology plan is a three-year plan on a two-year cycle with updates on a yearly basis. A full document is created every two years and a supplemental update is distributed annually. With technology changing so rapidly, this annual review is necessary.

The two-year planning cycle starts in the summer with surveys and interviews, and data is collected until the first of October. An information technology financial worksheet of needs for three years is generated identifying all the associated hardware, software, and operating costs — including staffing. The needs are defined as initiatives. The worksheets are distributed to the provosts and deans for review and prioritization. Based on the estimated funding level, the initiatives are prioritized from year to year to match the funding as closely as possible. This cycle of review may take several iterations. If initiatives are higher than the estimated budget and the items are defined as required, then additional revenues are requested.

IT Planning Cycle

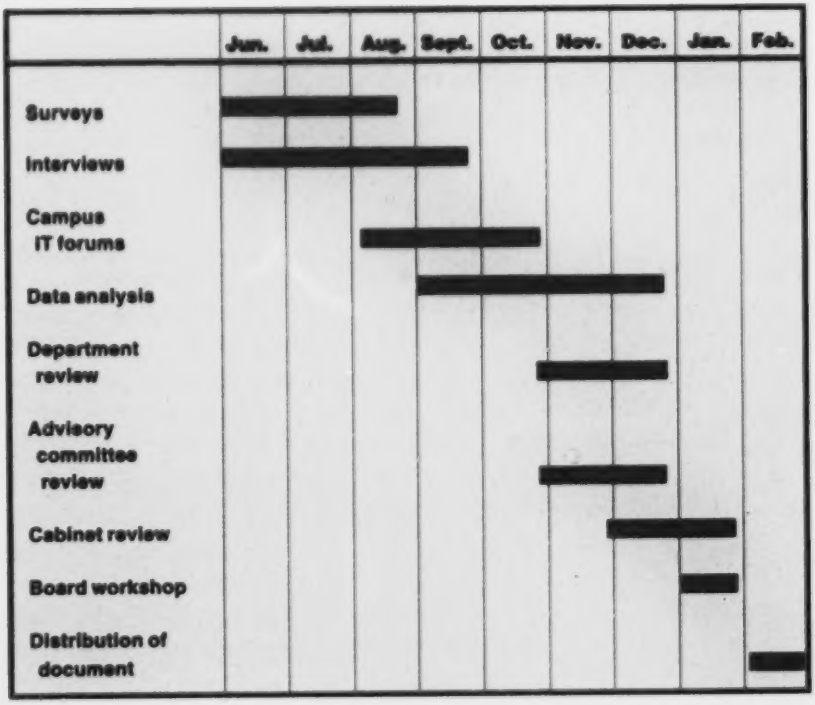

Figure 7.2

After the departments have reviewed and prioritized their requests, the IT worksheet is reviewed and may be modified by the academic and administrative advisory committees. Once the advisory committees are finished, then the worksheet is forwarded to the cabinet for review and recommendations, then forwarded to the board. The executive director of computing and information systems presents the plan at a board workshop in January of each year. The presentation includes an update to the previous plan and a review of current recommendations and financial considerations. Figure 7.2 shows the timelines.

Funding

Information technology is an expensive resource from the perspective of both capital investment and ongoing operational costs. The College of DuPage relies on a combination of restricted funds to support the information technology plan and an information technology fee of one dollar per quarter hour for every student. (This fee generates about $750,000 per year.) Grants and several other funding sources provide additional funds for technology. These sources include advanced technology grants, new initiative funds, operating budgets, non-credit revenues, departmental capital, and donations. The information technology plan has evolved to include all budgeted expenditures to provide a total view of the funds spent on IT and their associated operating costs.

Measuring Outcomes

To justify the cost of information technology (or any college goal) one must continue to evaluate the results of implementing a goal or objective. For example, what is the added value provided by implementing the recommendation in the IT plan? Can the recommendation be cost justified? Models of investment value should be defined. This will assist colleges in determining the value of the investment in information technology as it relates to the stakeholders, i.e., the faculty, boards, legislators, employers, and transfer institutions. Major suppliers of the technology should assist in the model development.

Conclusion

Planning for information technology must be the first phase in transforming our institutions to meet the challenges of the future. The IT plan can provide the strategic direction necessary to keep colleges in step with technology and to take advantage of future advancements. Careful attention to the importance of planning

can allow colleges to be more efficient and effective with their current resources, while satisfying future institutional goals as defined by the college's vision and mission.

Information technology provides tools that can be used by all faculty, staff, and students to improve learning, teaching, and the operation of the college. As important as these tools are, one should not lose sight of the fact that information technology is a means to an end, not an end in itself. Used properly, technology becomes an enabler that allows organizations to move ahead at the pace they set.

8 Strategic Planning for Information Technology

Dale T. Chapman
President
Lewis & Clark Community College

A Shifting Paradigm

We have upon us the first new paradigm shift since the Industrial Revolution, when knowledge became the mission of higher education and critical thinking skills took a distant back seat. Those institutions of higher education which adopt this new paradigm — teaching content and the technology of learning as a means of creating independent learners — will take an unfamiliar road into the future because, as Yogi Berra once proclaimed, "the future ain't what it used to be."

The Strategic Plan Must Be Integrated

Providing a strategic planning road map for the effective use of information technologies (IT) to move learning into the 21st century "ain't what it used to be" either. To be effective, community college strategic planning must integrate academic program development, capital equipment and building design, financial planning, student and academic support services, and IT planning into a single vision of the future. It is not possible for a college to have a clear sense of direction for the use of information technology until it achieves integration at the institutional strategic planning level.

Today, perhaps fewer than fifteen percent of all community colleges have completed integrated institutional strategic information technology plans. Those institutions which have plans typically describe their vision for information technology as:

> A highly integrated, networked environment that provides access to information technology resources in support of teaching and learning, student-centered administrative systems, and a support infrastructure designed to help students, faculty, and staff effectively use the power of information technology.

Information technologies as defined in today's community colleges cover a variety of computer and telecommunications-based technology initiatives including distance learning, multimedia courseware, campus-wide networks, wide area networks, student-centered information systems, library systems, classroom presentation systems, Internet access, and computer laboratories.

Design the Process

One of the first decisions an institution of higher education must face is to determine if the integrated institutional strategic plan is to be completed using only college resources and existing personnel or whether consultants will be called. Many institutions see an advantage to using consultants. Typically, the consultants' expertise, experience and insight, planning and analysis skills, tools and models, outside perspectives, and industry knowledge are powerful skills to augment the internal expertise of professionals with experience, commitment, knowledge of institutional and area resources, and subject matter.

A strategic planning consultant engagement includes a series of interviews, surveys, focus groups, and analyses of key requirements for the successful implementation of an integrated IT plan. Once such information is collected, a prototype IT strategy can be developed and validated through a series of workshops. This prototype IT strategy becomes the straw man model which, through the validation process, changes to accommodate the views of the diverse internal and external stakeholders served by the college. The final stage includes a continuous improvement model enumerating the elements of the plan, a timeline for implementation, and a communications strategy.

Identify the Stakeholders

An essential part of any strategic plan includes a clear determination of the college's internal and external stakeholders. A stakeholder is defined as any group, person,

or organization that can place a claim on the institution's attention, resources, or output. The following is a partial list of potential stakeholders:

- Students
- Faculty/Staff
- Alumni
- Local Employers
- Trustees
- Colleges/Universities
- Local Schools/Districts
- Public Service Agencies
- Elected Officials
- Government Agencies
- Business/Industry
- Taxpayers
- Parents
- Campus Vendors

Keep the Focus

In addition to defining stakeholders, it is important to determine guiding principles which should be employed to ensure that IT initiatives stay focused on institutional priorities within achievable parameters. Some guiding principles are:

- All activities must pass the "primary mission" test.
- Let the vision define the goals: provide access to technology, facilitate success in the use of technology, create an environment for the exemplary use of technology.
- Leverage high visibility, high impact initiatives where possible and appropriate.
- Capitalize on a gradual accumulation of successes rather than an inappropriate risk with major undertakings.
- Balance a plan to achieve maximum exposure to technology with initiatives that drive innovative projects.
- Affirm the principle that computer technology is an operational expense with annual life-cycle funding.
- Affirm that for every dollar spent on technology (hardware/software) there will be a corresponding commitment for support.
- Bring stakeholders into the decision-making process wherever possible.
- For every operational plan, project, or initiative, there must be a statement of critical success factors that relate to institutional objectives as well as a measurement plan to evaluate results.
- Celebrate outstanding achievement and honor prudent risk taking.

The Benefits of an Integrated IT Strategy

An institutional strategy should provide maximum access to high quality, affordable programs, and resources delivered within a service-oriented context. The outcomes of an integrated IT strategic plan should include:

- Improved communications
- More efficient operations
- Improved teaching and learning
- Employer satisfaction with the quality of students as employees
- Increased taxpayer support for the college
- Expanded access
- Improved decision making
- Improved efficiency and process
- Broader and more in-depth content in the teaching and learning process
- Work force with current skills
- Higher quality
- Improved productivity
- Improved student goal attainment
- Improved student satisfaction
- Improved retention and graduation rates
- Easier access to information.

Example in Practice

At Lewis & Clark Community College in Godfrey, Illinois, the college mission has been modified to include the teaching of information technologies as a method of acquiring lifelong learning skills, equal in importance to content instruction. An example of a continuous improvement model was recently completed by Lewis & Clark Community College.

The model, shown in Figure 8.1, has helped Lewis & Clark to focus on goals that include extending access to high quality instruction and services to more students at a cost significantly below the state average. In industrial terms, Lewis & Clark has set out to be the low-cost, quality producer.

Lewis & Clark IT Plan

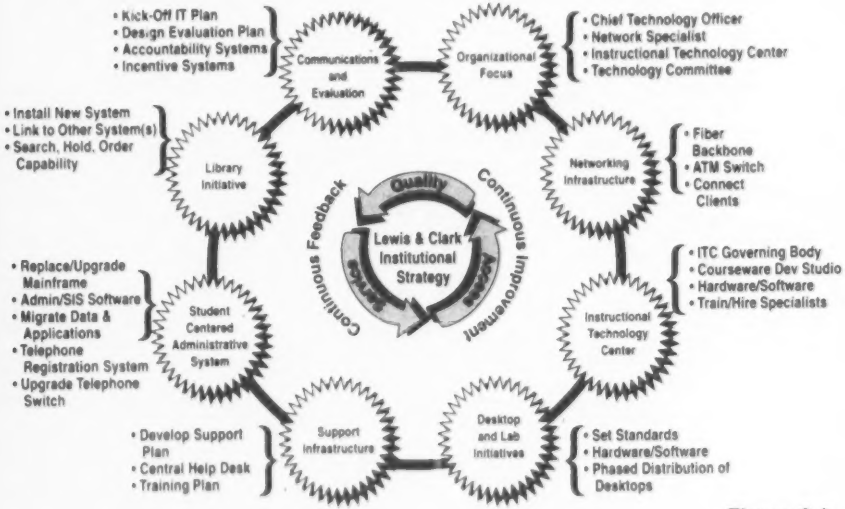

Figure 8.1

By integrating leading edge technology into the learning process, Lewis & Clark offers its students the opportunity to learn both content and the skills to use technology for lifelong learning. What makes this college unique is the comprehensive approach to integrating technology into the teaching and learning process. The results are impressive and include:

- Computer simulation and virtual reality experiments that will enhance traditional teaching in chemistry, biology, nursing, and physics.
- The training of local area employees in a Pentium™ lab in partnership with business and industry. Seminars are offered independently from the semester schedule.
- Participation in the Southwestern Illinois Higher Education Consortium. Seven colleges and universities are linked to offer instruction in up to three locations at once. Approximately fifty courses are now being offered through the distance learning network. (That number is expected to quadruple within the next three years.)

Conclusion

Institutions which integrate technology and content will thrive and succeed into the 21st century. Those which fail to do so will find their usefulness significantly diminished in the marketplace. The integrated IT plan becomes the cornerstone for successful growth. Such plans will typically include a highly integrated, networked environment that provides access to IT resources in support of teaching and learning, student-centered administrative systems, and a support infrastructure designed to help students, faculty, and staff effectively use the power of information technology. The plan should also include, however, a continuous improvement strategy which uses information from the college's internal and external stakeholders.

Although information technology is rapidly changing the process of higher education as well as the delivery method, higher education must still keep its focus on the student. The most important tasks higher education institutions can accomplish in this time of change is to move students from dependent to independent learners and to instill in them an aptitude for lifelong learning.

9 Integrating Technology into the Learning Process

Richard L. Wright
President
Bakersfield College

The technology wave is cresting and the essential question on campuses around the world is: "How do we create a paradigm shift from an industrial model of education that is time and place dependent to an information and technology based model which ultimately leads to learning on demand?" The major issues surrounding the implementation of technology on community college campuses are: 1) executive leadership and commitment; 2) development of a time-phased institutional technology plan; 3) hardware and software allocation, configurations, and procurement; and 4) staff training and an institutional infrastructure. Each of these issues is related to the others as represented in Figure 9.1 below.

Developing an Institutional Technology Plan
Executive Leadership and Commitment
Staff Training and Institutional Infrastructure
Technology Allocation, Procurement and Configuration

Figure 9.1

Executive Leadership and Commitment

College and university presidents already have a number of big issues on which to focus: funding levels, trustee relations, affirmative action, state-mandated programs, and so on. The implementation of technology into the learning process is difficult to add to the president's list. Many presidents are primarily concerned with "keeping the lid on" and provide only a maintenance function for the institution. Issues such as technology implementation represent too much risk and are avoided by the maintainers. However, an increasing number of presidents are taking a much more aggressive approach to technology implementation on campus and are using a variety of approaches. The creation of a dialogue on campus forces an institutional discussion and exchange on improving the learning process. Faculty are pleasantly surprised when the president actively engages in improving the quality of the learning environment and student outcomes.

While discussion is usually an easy first step, making the transition from discussion to individual classroom teaching and learning strategies is often more difficult because change has now been implied or introduced. If the president is public and vociferous about creating a focus on learning, innovative faculty will emerge who will ultimately lead others in the process of institutional change and implementation. The president's role is to be a catalyst by creating an agenda and recruiting innovative faculty to leadership roles. Once this is accomplished, the president's role then becomes that of a facilitator and resource provider. It is absolutely imperative that the president and senior administrators have a clear vision for improving the learning process and share it by involving the faculty and letting innovative faculty lead. To ensure that their vision is realized, the president and senior administrators must then provide adequate resources and support systems. The president is the linchpin in any successful transformation of this type since it crosses all areas of the institution. Having the courage to focus on improving learning in the midst of so many issues is evidence of vital educational leadership.

Development of the Institutional Technology Plan

Creating a shift in the learning paradigm requires careful planning if any measure of success is to be attained. For purposes of this discussion, an operational definition of technology includes those current and emerging advances in computing and communications which can be applied or integrated into the learning environment. Because virtually all disciplines will be touched by computing or communication

advances, both faculty and administrators must participate in any discussion about implementing technology. A broad campus discussion will help to create an institutional climate where proper planning can take place.

The foundations of an institutional technology plan are a faculty focused on improving learning as a student outcome and a strong financial plan. Most teaching faculty regularly assess their students' learning and make constant adjustments to their teaching strategies. This fact makes them receptive to any institutional planning effort that focuses on how technological advances can facilitate the outcomes they desire for their students. Once wide participation is attained, devising a financial plan to support the entire effort will become more straightforward. The design of hardware and software applications and the development of a faculty training and support program can then be pursued.

Allocation and Procurement of Hardware and Software

It's not surprising that the scope of a technology plan is dependent in large part on the strength of the financial plan. These plans represent the continuum from a Yugo™ to a Lexus® and may contain telecommunications and computing hardware and software in the form of multimedia and distance learning systems.

Allocation of technology to faculty is best done on a request for proposal basis. A group of peers sets the award criteria and makes the selection of winning proposals. The number of winning proposals is determined by the amount of dollars available to purchase the technology. Team proposals usually fare well in this competitive environment.

There are several important factors to consider in the area of procurement. First, there should be an institutional standard. Second, vendors that have state or federal contracts may be able to give discounts when purchases are made from these contracts. Third, large purchases may best be made as lease-purchase agreements. This is credit card buying, however, and can cramp an institution's purchasing power for the length of the contract. Finally, the lowest price is not always the best deal. Consideration should be given to quality, service, warranty, etc.

Staff Training and the Institutional Infrastructure

Each institution has a group known as the early adopters. The key to technological

integration is to provide this group with the required support and get out of the way. Early adopters don't seem to mind the long and steep learning curve associated with emerging technologies. They'll take the time to slug it out and are the institution's best prospects for teaching other faculty to master a given technology application in an abbreviated timeframe.

Beyond the early adopters, any institution has islands of expertise among the staff. These key employees should be sought out and asked to run workshops to share their expertise. At Bakersfield College, 34 such workshops are taught each year, and the technological capabilities of the staff have risen dramatically in the three years the workshops have been offered.

If the institution is to develop a facility with various types of technology applied to its teaching and learning strategies, it not only must have a comprehensive staff training program but it also should have an infrastructure to support technology applications chosen by the faculty. Specifically, the institution should provide a faculty development lab and staff with special types of expertise such as programming, graphics, videography, instructional design, etc. These types of expertise are present on most campuses. If the institution's focus is on learning, it is relatively easy for the president to make these valuable resources available to assist faculty to become better teachers.

Some Final Thoughts on Implementing Technology on Campus

- Most faculty want to be better teachers and maximize their time with their students.
- Faculty are "tinkerers" and will expend amazing amounts of efforts to improve their techniques if provided with an encouraging and supportive administration.
- Bringing technology into the classroom is expensive and forces choices. This is where administrative leadership is critical.
- A carefully-reasoned technology plan brings new excitement to faculty and students alike.
- There are numerous instructional strategies that work well. Technology is only a tool.
- Keep learning as the central focus and implementation problems and headaches become workable.

10 Kiosks as Catalysts for Transformation

Stephen Jonas
Vice President for Administration
Sinclair Community College

Sinclair Community College (SCC) is a comprehensive two-year institution with approximately 20,000 students and a budget of $59 million located on a single campus in Dayton, Ohio. Sinclair has focused its energy on programs that link access, opportunity and educational excellence to the demographic and economic base of the community it serves. This challenge is reflected in the college's recently adopted vision statement:

> "Before us lie uncharted worlds of opportunity. Sinclair will be the bridge into that future, giving open access to opportunity, intellectual challenge, and self-discovery for students with diverse needs.
>
> - With Sinclair, people will pursue their quest for lifelong learning through affordable, high quality education.
> - At Sinclair, people will benefit from a caring approach to teaching and learning that provides personal attention and encourages individual growth.
> - Through Sinclair, people will be empowered with knowledge and skills for their journeys into tomorrow.
> - Our success shall hinge on turning these values into action:
>   - Dedication to quality and excellence
>   - Reliance on anticipation, imagination, and innovation
>   - Commitment to responsible citizenship within our community
>   - Adherence to the Sinclair credo: 'Find the need and endeavor to meet it.'
>   - Confidence in the courage, determination, and diversity of our students, employees, and supporters; and
>   - Belief in unlimited human potential."

Information Technology at Sinclair Community College

Underlying Sinclair's commitment to leveraging information technology as a critical resource is the recognition of the importance of information access. Over the last few years, Sinclair has invested heavily in a technological infrastructure that includes the installation of a campus-wide fiber optic TCP/IP based network and migration to outsourced administrative applications. Every full-time employee (faculty, administrators, and support staff) has a PC on his or her desktop with connections to the network. In addition to accessing the Datatel Colleague™ databases (student, financial, and human resources applications), individuals can access the Internet, the OhioLINK library information system, and many software packages for office productivity. The college recently installed a state-of-the-art digital telephone system and completed Phase I of the installation of a campus- wide video distribution system to support interactive technologies that facilitate student learning.

One of the highlights of the future of learning at Sinclair is an exciting technology/learning initiative — a Center for Interactive Learning (CIL). The CIL is a new facility planned for completion in the fall of 1997, which will serve as a hub of activity for the transformation of teaching and learning. Sinclair's vision for the CIL is:

> "The Center for Interactive Learning (CIL) will be a place where people of diverse backgrounds can see and experience the future of learning and work. In the CIL, students, faculty, and staff will connect with global communities of learners to share knowledge and ideas, to invent the future, and to construct personal paths into that future. The Center for Interactive Learning will be a place that delights in the empowerment of people through technology and a place that honors scholarship.
>
> "The Center for Interactive Learning will be, above all, a place where everyone is a student. In the CIL, everyone can fearlessly try out new ways of learning and teaching, evaluate experiments, and ponder their implications. In the CIL, we will work to assimilate our best ideas into the fabric of Sinclair's academic programs and culture and to disseminate our innovations to a regional, national, and worldwide audience."

The CIL will help Sinclair continue its transformation from a teaching to a learning organization. The CIL facility will provide a unique environment for:

- Faculty, administrative, and technical staff training and development
- Instructional design and pilot projects
- Technological investigation and evaluation
- Exhibitions and demonstrations
- Instructional media production
- Community outreach to K-12, other colleges, and the business community.

The Sinclair Vision: Leveraging Information Technology

Sinclair Community College, like the rest of higher education, will undergo significant changes during the next five years as it transforms teaching and learning in the face of increasingly unacceptable levels of student costs, rising institutional expenses, decreasing state subsidies, a levy campaign that focuses on doing more with less, and the power of new technologies to enhance student learning. Information technology provides the major infrastructure to support learning, including campus-wide networks to share instructional resources and information; access to worldwide digitized resources from classrooms, offices, businesses, and homes; individually tailored instruction providing learner-centered interaction; outcomes-based, open-entry and open-exit courses supported by new assessment tools; and routine electronic communications among students and faculty, students and other students, and students and the campus. The student's role in all of this is to be an active learner.

Development of a Campus-Wide Information System

In 1990, Sinclair began to address an important issue that affects many other colleges and universities: providing quality counseling services to meet the wide-ranging needs of an increasingly diverse population of students. Although Sinclair was committed to implementing strategies to ensure student success, other budget priorities made it unlikely that Sinclair would add more counselors to meet the increasing demand. The Intouch™ kiosk system project, developed in partnership with The Robinson Group (TRG), expands student access to Sinclair's counseling resources without hiring additional staff. It should be noted that the kiosks are not seen as replacements for skilled counselors; Sinclair places a high value on personal interaction between students and counselors. The kiosks are intended to be used for routine

and predictable academic advising tasks. This allows counselors to spend more time with those students who really need assistance from professional personnel.

Kiosk technology has been a catalyst for transformation at Sinclair. The kiosks offer several benefits.

- They empower students by providing them with direct access to academic records, campus information, and other services.
- The counseling services help to address the expanding need for academic and personal counseling services due to increasing numbers of underprepared and nontraditional students, diversity of the student body, and the complexity of program offerings.
- They attract students not now receiving counseling services because they are resistant to seeking help, evening and weekend students, or students with predictable questions that do not require counselors.
- They maximize counselor resources by expanding access to counseling resources without adding more staff. Kiosks help to optimize counselor time and effectiveness by off-loading routine items to an automated service.
- Kiosk technology complements human counselors; it does not replace them. It provides new applications to improve customer services (e.g., as a support to marketing, recruitment, and retention) and enhances efficiency.

Does Fred Sound Like a Student on Your Campus?

"I don't keep regular hours. I work and go to a community college and a university. I don't necessarily see a person every time I need information. I expect that there will be some sort of a system in place so that I can access information at my convenience. That doesn't mean that it is available just during the day. I can be at home or at work and I take night classes as well. I need to have the information when it is convenient to my schedule. Some may say that this is difficult, but this is the way I need to have it to continue my education. I'm in a different generation than my parents: Generation X, the MTV Generation, or whatever you call it. Things have to be slick, captivating, visually appealing, pleasing. Society is pumping all these images at me that really catch my attention, so it's kind of difficult to focus in on a static type of media. Most of the time I need to know something to continue on and if I have to go through a bureaucracy to get it, I may never even bother to do it or become frustrated as I try to get that service."

Implementation Process for Campus-Wide Information System

The concept of a smart kiosk grew out of a Sinclair project called CWEST (Counseling With Expert Systems Technology). CWEST was funded primarily by a grant from the state of Ohio to promote the use of artificial intelligence and expert systems in an effort to transfer technology from military to civilian applications. To this end, a team of faculty, academic counselors, computer support staff, an artificial intelligence specialist, and an external consultant from the Center for Artificial Intelligence Applications developed an expert systems prototype.

During the first year, the CWEST team created a prototype of an expert system that could assist students with the selection of courses for the next term. The team decided to pursue the idea of a touch screen kiosk, possibly with multimedia, so that the expert system could be made available in convenient locations and the system would be appealing and easy to use, even by students who might not be computer literate. The team also realized that a kiosk could be used for many other applications such as maps and general campus information, access to personal records, and online registration.

It soon became apparent that the team's vision of CWEST had become too large an undertaking for the Sinclair team to complete on its own. The difficulty of scope and resources was resolved when Sinclair formed a partnership with TRG™ to combine the CWEST advising expert systems with TRG's Intouch™ kiosk software, which were complementary in concept and functions. For more than two years Sinclair has been running the combined TRG/SCC Intouch software, which was installed initially in a stand-alone mode, then connected to the campus network for access to the Datatel Colleague™ database. New features and enhancements are continually being added in response to suggestions of students, faculty, and staff. The Intouch kiosk system now includes thirteen kiosks connected to the campus network. The strengths and limitations are shown on the next page.

Kiosk Strengths	Kiosk Limitations
Interactive	Fixed location/lack of portability
Multimedia	Cannot detect emotional reactions
Mainframe access to data	Expert systems based on norms
Rapid update to information	Some students intimidated by technology
Information is convenient/fast	Limited alphanumeric input
Ease of use	Developmental time and cost
Runs unattended	Requires on-going support
Use can be measured	
System has reliability	
Information is consistent and unbiased	

When students use a Sinclair Intouch kiosk, they are offered a wide variety of applications to choose from. These include:

- Campus maps and directories
- Personal records
- Course information
- Intouch counselor
- College costs
- Financial aid and scholarships
- Frequently asked questions
- Admissions and registration
- Degree programs and majors
- Services for students
- Employment and career planning
- Corporate and community services.

Plans for the future at Sinclair call for an expansion of existing applications and the addition of some brand new ones, such as:

- Off-campus kiosks
- Online registration and credit card fee payment
- Course recommendations and degree audit program requirements
- Transfer information
- Course planning guide
- Financial aid status
- Textbook ordering system
- Campus ID card applications
- JobNet (State of Ohio Bureau of Employment Services job opportunity database)
- Student feedback system
- Employee applications
- Information gateway
- Technology integration: multimedia, video compression, desktop video conferencing.

The Benefits and Impacts of a Campus-Wide Information System

The primary impact of the kiosk system has been in the area of academic counseling. The system has not put the counseling staff out of business. On the contrary, academic counselors are seeing as many students as ever. The difference is the quality of the counseling sessions. Students are better prepared, usually with transcripts and lists of their potential course schedules in hand, and are asking more direct and relevant questions. The kiosks appear to be serving as pre-counseling tools that students use to explore options on their own before meeting with counselors. Some counselors use the system specifically for this purpose. While one student consults with a kiosk, the counselor meets with another student, thus nearly doubling the number of appointments without a loss of quality.

Orientation sessions for new students (and new employees) are also simplified. Rather than overwhelming newcomers with armloads of brochures, documents, and catalogs, the counselors acquaint incoming freshmen with the kiosk system. As a result, the students know where to find information when they need it and are ready to absorb it. This helps significantly to address the problem of information overload which

can be especially difficult for adult learners who are often apprehensive about attending college. Counselors are not the only college personnel experiencing benefits from this simplified process for disseminating information to Sinclair's 20,000 students each quarter. The campus bookstore, the placement office, the registrar's office, the admissions office, and offices that provide other support services (such as tutoring and assistance for disabled students) all benefit from the kiosk system.

Student Use and Cost Effectiveness

Approximately forty percent of Sinclair students access personal records at least once per quarter. About twenty-five percent of the kiosk users were not registered students (new or continuing students temporarily not enrolled). When students were interviewed in focus groups they reported that they would like to have more information on library resources available to them on the kiosk and they would like to be able to conduct business transactions using an ID card. From the student viewpoint, the benefits of using the kiosks far outweigh the inhibitors.

A cost analysis of the Intouch kiosk system shows that the kiosks provide services for less than forty percent of the cost of employees providing equivalent services. See Figure 10.1.

Comparative Cost Effectiveness

Intouch kiosk system	$ 2.16 per student per year
Printed course catalog	$ 1.58 each
Course brochure	$ 1.00 each
Counseling	$11.75 per half hour

Note: The costs (including salaries and fringes) of counselors, clerical staff, and students were calculated at $1,542 per month. The monthly cost of a kiosk, including hardware, software, networking, and maintenance over an estimated four-year life span, was calculated at $600 per month.

Figure 10.1

Customer Feedback

In the future, devices such as kiosks, desktop video conferencing, and other technologies will facilitate two-way communication between an institution and its students

by means of surveys and polls, as well as direct communications. As students become the primary users of administrative and academic support systems, it will also be critical for software designers to obtain input from students regarding their information needs and the usability of information systems. Institutions will need to develop processes for organizing student focus groups and volunteers for beta testing as Sinclair has done throughout the development of the expert systems and other components of the Intouch kiosk software.

The kiosk system has been a catalyst for transformation. Sinclair's Intouch kiosk system provides a glimpse of things to come in the evolution of computing in higher education. As an institution, Sinclair feels strongly that the driving force of the revolutionary changes ahead will be students as the primary users of our institutional information systems.

11 The Connected Campus and Beyond

John T. May
President
Atlantic Community College

A connected campus is one which has a local area network (LAN) accessible to students, faculty, and staff and supports the full range of the college's information-based functions, both academic and administrative. In addition, access to the Internet is provided for those on the LAN. Today, a connected campus is generally accepted as the new norm.

The Ongoing Change

A change which will compel colleges to provide a networked environment for instruction is now emerging. The traditional monopoly which community colleges enjoy within their service areas will erode as more colleges and private companies make instruction available via distance education, particularly asynchronous delivery over the Internet. While the larger colleges and consortia, such as the League for Innovation in the Community College, are clearly taking the lead, smaller colleges like Pueblo Community College in Colorado already have a number of such courses online, and anticipate delivering entire online degree programs soon. Unlike earlier times in the application of technology to education, educators are beginning to realize that if they fail to develop such delivery, others will. The result will be that students who previously had little choice other than the local college will have greatly improved access to courseware from a wide variety of institutions.

The Student Access Network (SAN)

As fully networked campuses have become the norm, another change has gained momentum — the movement to a client-server environment. Eleven colleges have formed a consortium under The Robinson Group™(TRG) to specify and support the development of software uniquely suited to this environment. TRG staff began the process by working for more than a year with the faculty and staff of each college

to specify needs for information. Software is being designed to support almost every aspect of the students' and institutions' needs for access to information, whether instructional or administrative. In broad concept, all of an institution's information is viewed as residing in a virtual data warehouse. Students, faculty, and staff will be able to access the data in this warehouse from any location on the campus network—and from off-campus if wide-area network (WAN) access is provided.

Barriers

Despite the compelling reasons to develop the connected campus, there are still barriers, which may include:

- Lack of institutional vision or the leadership to develop one
- Unclear role of technology in the learning environment
- Lack of understanding of the capability of current technology
- Difficulty in predicting future capabilities
- Difficulty in justifying costs
- Inadequate internal support
- Unrealistic expectations
- Lack of buy-in by faculty and staff
- Difficulty in obtaining resources.

Action

Community colleges interested in implementing the connected campus should anticipate these barriers and act to break them down. The following ideas address some of the barriers and outline suggested action to overcome them.

Resources. To the degree that establishing the connected campus has the potential to reduce administrative expenses and to generate revenue, some of the costs may be considered an investment on which a return is likely. Priorities should be reordered to allow these investments to be made.

Planning. To a large degree, faculty and staff support is achieved by full participation in the planning process. The information technology plan must relate to the college's mission and be integrated into its goals and objectives. Broad participation in the planning process has the additional advantage of educating the participants in the technology and its application to instruction or administration. Substantial resources are available both for the planning process and for educating faculty and

staff. For example, the Higher Education Information Resources Alliance of ARL, CAUSE, and Educom has published a series of reports targeted for college presidents. Report #1 is titled, "What Presidents Need to Know . . . About the Integration of Information Technologies on Campus." This set of reports is available through CAUSE or online at: **http://cause-www.colorado.edu.collab/hiera.html.**

Buy-in. How a college proceeds with obtaining a buy-in from faculty and staff depends on where the college is catching the technology wave. If a college is among the pioneers in adopting new technology, using a pilot project with faculty and staff who are fault tolerant is appropriate. In adopting more mature technology — and today that would be the case for a college installing networked applications — a more aggressive implementation can be used. Experience tells us that the more broad-based the implementation of a new technology, the more detailed the planning must be. Even with a mature technology, starting with a small pilot program may be appropriate.

The Future

Beyond today's connected campus, profound changes in education delivery are looming. As access to high bandwidth technologies becomes common, distance education will be as viable as interactive multimedia, with delivery at any time and at any place where there is access to this technology. Demonstrations of high bandwidth delivery are ongoing, with Rensselaer's project CUPLE (Comprehensive Unified Physics Learning Environment) an outstanding example.

When Rensselaer Polytechnic Institute wanted to change the delivery method for the freshman physics and calculus courses, they had to make sure that their whole team was onboard with the idea. They systematically addressed the rationale for maintaining the status quo by providing evidence that showed that the most common delivery method for instruction — the lecture — does not support the other ways that students learn, such as reading, problem solving, collaborative learning groups, discussions, and labs. To dispel the idea that a good lecturer can make all the difference, they also showed that there is no direct correlation between increased learning and different lecture styles. More important, perhaps, they were able to show that the lecture approach to delivering instruction is very expensive — much more so than CUPLE.

CUPLE uses a studio format which focuses on student problem solving. When students come to class they find a room designed for two-person teams at workstations that include computers and open workspace where the equipment for the day's hands-on lab is arranged. The instructor can see all the computer screens and assess how the students are doing. Laboratory data acquisition and analysis tools are imbedded into hypermedia text that introduces the topics, links the students to related materials, and poses questions for the students. The hypermedia activities are being created by the CUPLE consortium of schools, led by Rensselaer and the University of Maryland.

Students prefer the new studio format and are performing as well as or better than students in traditional courses. The courses have proven to be twenty-five percent more cost-effective than traditionally taught classes, thanks in part to the thirty-three percent reduction in class contact time.

Objections to the type of delivery are increasingly irrelevant as the combination of computer and communications addresses many concerns. In fact, collaborative learning groups, rapid communication with the instructor, tutoring through a virtual tutorial center, counseling, and access to specialized staff are all possible with this delivery. The college which succeeds in this new environment will have course materials and a full range of support services available to students online.

No college will be able to provide the best in all courses and programs. But if a college concentrates on a few things in which it can demonstrate excellence, it will have no boundaries to its delivery area. Working with a college's counseling function, a student will be able to craft a program which will take advantage of the most outstanding courses worldwide. This vision is unsettling to much of today's academic enterprise. Even if only partly realized, it suggests that today's academic structures will have to be radically changed. Colleges will compete to provide the best in course material, and will be forced into cooperative arrangements because no single college will have the resources to create excellence in all courses and programs. Non-collegiate entities, particularly those in entertaining and broadcasting, may begin courseware development and even delivery. While such challenges will force changes in today's colleges and universities, the student will benefit. The range of programs and courses will have almost no limits, and the student will have the ability to select the best courses according to interest and need.

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We also wish to thank Dr. Jennifer James for her dynamic presentation on the new ways of thinking that she says must be fostered by higher education institutions as they move into the 21st century. Dr. James is a renowned cultural anthropologist who speaks around the world. She is currently working on a PBS series.

Our thanks as well to Dr. Stan Davis who spoke about the necessity of lifelong learning and the ability community colleges may have to assist this approach to learning. Dr. Davis spent twenty years on the faculties of the Harvard Business School, Columbia and Boston universities. He is the author of *2020 Vision*, *Future Perfect*, and other books.

In addition to the authors, many community college administrators and industry specialists attended the Forum for Community College Presidents and contributed their time and thoughts to provide the foundation for this monograph. They include:

From Algonquin College in Ontario, Canada: Bob Mitchelson, vice president for finance and administration, and Dick Lindale, general manager, information systems; Anne Arundel Community College in Arnold, MD: Dennis Golladay, vice president for academic affairs, and Edgar Mallick, vice president for administration; Anson Community College, Polkton, NC: Donald Altieri, president.

From Atlantic Community College in Mays Landing, NJ: Douglas Hedges, executive director for IT services; Bakersfield College in Bakersfield, CA: Linda McElwrath, dean of instructional technology; Borough of Manhattan Community College, New York, NY: Ronald Spalter, dean of administration and planning; Bunker Hill Community College, Boston, MA: C. Scully Stikes, president, and Brian Corpening, executive assistant to the president.

From Centennial College, Ontario, Canada: Catherine Henderson, president, and John Johnston, chief information officer; College of DuPage, Glen Ellyn, IL: Michael T. Murphy, president; Community College of Allegheny County, Pittsburgh, PA: John M. Kingsmore, president, and Dale Conrad, vice president for administrative services; Contra Costa College, San Pablo, CA: D. Rose, president; Contra Costa College District, Martinez, CA: Helen Spencer, vice chancellor for educational programs and services; Cuyahoga Community College, Cleveland, OH: Frank W. Reis, executive vice president for human resources and administration.

From Danville Area Community College, Danville, IL: Harry J. Braun, president, and David L. Kietzmann, dean of career and technical education; Florida Community College at Jacksonville, Jacksonville, FL: Jack T. Tinsley, associate vice president, information systems; Fox Valley Technical College, Appleton, WI: H. Victor Baldi, president, and Kenneth A. Schindler, director of information systems; Guilford Technical Community College: Sylvester E. McKay, vice president for curriculum and instructional technology; Hudson Valley Community College, Troy, NY: Joseph J. Bulmer, president, and Bryan L. Eaton, director of the computer center.

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From Miami-Dade Community College: Albert LeDuc, director of computer services; Moraine Valley Community College, Palos Hills, IL: Vernon O. Crawley, president, and Kathy Wilders, vice president for information services and planning; Nassau Community College, Garden City, NJ: Sean Fanelli, president, and Dennis Gai, assistant vice president for management information systems; North Shore Community College, Danvers, MA: J. Laurence Reeves, dean of administrative services, and Richard Scaletti, director of MIS; Orange County Community College, Middletown,

NY: William F. Messner, president, and Morton Meyers, executive vice president; Richland College, Dallas, TX: Stephen Mittelstet, president; Saddleback Community College, Mission Viejo, CA: Robert A. Lombardi, chancellor, and Allan MacDougall, director of information resources.

From Shelton State Community College, Tuscaloosa, AL: Thomas E. Umphrey, president; Sinclair Community College, Dayton, OH: Katherine Neff, director of academic computing; Springfield Technical Community College, Springfield, MA: Andrew Scibelli, president, and Cheryl Groeneveld, dean of administrative services; Suffolk Community College, Selden, NY: John F. Cooper, president, and Steven F. Schrier, vice president; Vincennes University, Vincennes, IN: Phillip Summers, president, and Carl Koenig, chief information officer; York College, Jamaica, NY: Marcia V. Keizs, acting president.

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About the Authors

Ms. Darlene J. Burnett

Over the last five years, Ms. Darlene J. Burnett has specialized in helping colleges and universities solve problems and implement technology in administrative and academic computing. Her focus is on helping institutions create a student-centered environment with an emphasis on productivity, effectiveness, accountability and improved access and quality.

Before joining IBM, Ms. Burnett was responsible for the computer instruction program at Johnson County Community College in Overland Park, KS. During her time there, she developed the computer technology curriculum, adjunct faculty training and other programs. At the University of Kansas, she served on a team that established academic computing support; she also provided support and designed solutions for administrative computing at Kansas State University at Pittsburg.

At IBM she has been recognized for her achievement in improving and integrating existing processes to improve effectiveness, quality, and customer satisfaction. She has managed more than 100 programmers, providing worldwide support on a 24-hour basis. Ms. Burnett holds an M.B.A. in organizational behavior and marketing from the University of Missouri at Kansas City, MO, and a B.S. in computing from Kansas State University at Pittsburg, KS.

Dr. Sunil Chand

Currently the executive vice president of academic and student affairs at Cuyahoga Community College in Cleveland, OH, Dr. Sunil Chand has been a teacher and administrator in his native New Delhi, India, as well as in England and the United States.Cuyahoga Community College is the largest comprehensive community college in Ohio, with more than 23,000 credit students each quarter and another 23,000 enrolled in other programs. The college offers more than seventy career programs on three campuses and two more training sites. Before joining the executive staff at Cuyahoga, Dr. Chand served as vice president of academic services at Richmond College in London and as dean of the school of arts and sciences at Triton College in River Grove, IL. He holds a Doctor of Literature degree from Kent State University in Kent, OH.

Dr. Dale T. Chapman

Dr. Dale T. Chapman has been the president of Lewis & Clark Community College in Godfrey, IL, since 1992. Under his leadership, enrollment has increased from 4,400 students to more than 6,000 students. He has directed $26 million in facilities construction, technology implementation and program expansion at Lewis & Clark, including the construction of a new Advanced Technology Center and Science Building.

Dr. Chapman is on the board of the Illinois State Chamber of Commerce and serves on the Legislative Committee of the Illinois Council of Community College Presidents, as well as on the boards of several southwestern Illinois organizations. Prior to being named president of Lewis & Clark, Dr. Chapman served as executive vice president for administration, finance, and instruction at Lewis & Clark and vice president for administration at Suomi College in Hancock, MI. He has more than twenty years of professional experience in higher education.

Dr. Chapman holds an Ed.D. in administration, planning, and social policy from Harvard University and an Ed. M. in higher education administration from Michigan State University, where he was a Kellogg Fellow.

Dr. Stephen Jonas

Dr. Stephen Jonas is the vice president for administration at Sinclair Community College in Dayton, OH, where his responsibilities include information systems and services, computer applications, technology partnerships, institutional planning and research, human resources and equal employment opportunity, learning resources, and grants development.

He has been working in higher education for nearly thirty years and his experience includes serving as the director of institutional planning and research at Lorain Community College in Elyria, OH, work as an institutional studies analyst for the regional campus administration at Indiana University in Bloomington, IN, and other positions.

Dr. Jonas is a member of the American Association of Higher Education, the American Society for Training and Development, the American Society for Quality Control,

and the World Future Society. He holds a doctorate in higher education and a master's degree in college student personnel administration from Indiana University in Bloomington, IN.

Dr. John T. May

Dr. John May is president of Atlantic Community College in Mays Landing, NJ. A graduate of the Air Force Academy, he served as a pilot, a scientific program manager with the Air Force Office of Scientific Research, and as a faculty member at the Air Force Academy. As permanent professor and head of the Academy's physics department, he supported early development of the department's interactive computer-assisted mastery learning program. As the Academy's vice dean and, later, acting dean of faculty, he played a leading role in the decision to install a local area network serving both administration and instruction.

After spending a year as Visiting Professor of Physics at North Carolina State University, Dr. May became the dean of academics at Atlantic Community College. His five years in that position saw rapid progress in building the college's technological infrastructure, particularly its local and wide area networks. Dr. May's masters and Ph.D. degrees are in physics from North Carolina State University.

Dr. Terry O'Banion

Dr. Terry O'Banion is the executive director of the League for Innovation in the Community College, an international consortium of leading community colleges in the United States and Canada dedicated to experimentation and innovation. In his thirty-three years in community college education, Dr. O'Banion has served as dean of students in two Florida community colleges and as a professor of community college education at the University of Illinois in Urbana, IL, where he was selected for the Outstanding Teacher Award seven years in a row. He has been a visiting professor at multiple institutions of higher education and vice chancellor of education for the Dallas County Community College District.

The author of ten books on the community college, Dr. O'Banion has also written more than ninety other article and monographs on various aspects of community

college education. Among his many honors, Dr. O'Banion includes the 1994 Leadership Award from the American Association of Community Colleges. He has an M.Ed. in guidance and counseling from the University of Florida, Gainesville, FL, and a Ph.D. in higher education administration from Florida State University in Tallahassee, FL.

Dr. Diana G. Oblinger

Since 1993, Dr. Diana G. Oblinger has been the academic programs manager for IBM Higher Education, located at the Institute for Academic Technology, a collaboration between IBM and the University of North Carolina at Chapel Hill, NC. Under her leadership, the Institute has offered a series of seminars and workshops that empower faculty and staff to improve instruction on their campuses.

Prior to joining IBM, Dr. Oblinger was responsible for managing the academic programs of 17 departments with 250 faculty and 2,000 students at the University of Missouri, Columbia, MO. During her tenure as an administrator, she was recognized for her pioneering work in student recruitment and retention, faculty development, and the establishment of computer clusters in support of academic programs. Combining her academic, administrative and technology experience, she is uniquely qualified to address complex institutional problems involving both people and technology. Among the issues she addresses are institutional competitiveness and instructional effectiveness.

Dr. Oblinger is the author of numerous papers on multimedia, enhancing instruction with technology and academic advising. She has received three outstanding teaching awards, a research award, and was recently named Young Alumnus of the Year by Iowa State University. She holds an M.S. in plant breeding and a Ph.D. in cytogenetics from Iowa State University in Ames, IA.

Mr. Sean C. Rush

As the General Manager of Higher Education, IBM North America, Mr. Rush is responsible for managing IBM's sales and services for higher education. Throughout his career, Mr. Rush has worked with more than seventy-five public and private institutions in the areas of total quality management (TQM), business process reengineering and operations management.

His accomplishments include the first study of campus facility conditions, which resulted in the landmark report, *The Decaying American Campus*. He also led the first cost benchmark study in higher education, sponsored by the National Association of College and University Business Officers. Prior to joining IBM, Mr. Rush served Coopers & Lybrand USA as chairman of the firm's national higher education and not-for-profit practice, as well as serving as the partner-in-charge of the firm's higher education consulting practice providing financial, operational and planning services to colleges, universities and other nonprofit organizations.

Mr. Rush is a member of the Association of Governing Boards of Universities and Colleges, the National Association of College and University Business Officers, the Society for College and University Planning, and is an honorary lifetime member of the Association of College and University Facilities. He has published numerous books and articles in the area of higher education. He is listed in Who's Who in American Education and Who's Who of Emerging Leaders in America. He holds an A.B. and M.B.A. from Boston College and an M.S. from Boston University.

Dr. Charles C. Spence

Recently named the chancellor of Contra Costa Community College District in Martinez, CA, Dr. Charles C. Spence served as the district president of Florida Community College at Jacksonville (FCCJ) until January 1996. FCCJ is a five-campus community college with 90,000 students enrolled in adult basic education, adult high school, vocational education, specialized workforce training, and college credit university transfer programs. Full-time enrollment at FCCJ increased almost fifty percent under Dr. Spence's ten years at the helm.

Under Dr. Spence's leadership, FCCJ built a Center for Teaching and Learning to encourage excellence in instruction and developed a comprehensive literacy program for the city of Jacksonville. In addition, FCCJ developed a nationally recognized

institutional assessment process that reviews all aspects of the college's performance every five years. Another major accomplishment attributed to Dr. Spence's vision is the creation of the FCCJ Urban Resource Center to provide all levels of workforce training for business and industry in northeast Florida. Among his many honors, Dr. Spence has received the Pacesetter Award as the most effective chief executive officer from the National Public Relations/Marketing Association, and he was selected as the most effective educational leader by the Florida Civil Rights Commission for his leadership in the hiring of minorities, women, and people with disabilities. Dr. Spence earned a Ph.D. in higher education at Michigan State University. He received his master's degree in counseling from Wayne State University.

Mr. Gary Wenger

As executive director of computing and information systems at the College of DuPage in Glen Ellyn, IL, Mr. Gary Wenger is responsible for both academic and administrative computing on campus, including the strategic and tactical planning, operations and budgeting.

During his eleven years at DuPage, Mr. Wenger has installed systems that include human resources, student registration, records, ad-hoc reporting, library, and theater management. He led a project to install a telecommunications infrastructure providing district-wide networking for voice, video and data communications. He also has completed several information technology plans as well as a new enterprise data network connecting more than 2,000 personal computers.

Mr. Wenger has worked in higher education for more than twenty-five years. His experience includes serving as the associate director of administrative services at West Virginia Network for Educational Telecomputing, a computing consortium of sixteen colleges and universities in West Virginia, and director of the computer center at Quincy College in Quincy, IL.

Mr. Wenger is a member of the CAUSE National Networking Committee, the IBM National Advisory Council on Higher Education, and is acting president of the board of directors of netILLINOIS. He holds a bachelor of business administration in management systems from the University of Iowa in Iowa City, IA, and has completed his coursework toward a master's degree in management science.

Dr. Richard L. Wright

Dr. Richard (Rick) L. Wright , president of Bakersfield College (BC) in Bakersfield, CA, was born and raised in the Midwest before moving to Colorado to earn his doctorate. He has been the president of Bakersfield College since 1983, and six years ago focused his presidency on improving the learning process on campus. This has lead to a comprehensive infusion of technology on the BC campus, and what he calls "rewarding work with the college faculty." The model developed at Bakersfield is now being developed into a model for the state of California community college system that will include three regional centers for the purpose of creating a multisensory learning strategy based on technology.

Dr. Wright holds an M.A. in vocational rehabilitation counseling from Kent State University in Kent, OH, and a Ph.D. in college student personnel administration from the University of Northern Colorado in Greeley, CO.

About the Editors

Dr. Laurence Johnson

Dr. Laurence Johnson, associate director of the League for Innovation in the Community College, received the Ph.D. in higher education administration from the Community College Leadership Program at The University of Texas at Austin. With more than a dozen years of community college teaching and administrative experience, Larry has been active throughout his career in promoting effective applications of technology. In addition to his technology-related interests, Larry serves as the editor of *Leadership Abstracts*, and is a member of the editorial board of the *Community College Journal of Research and Practice*.

Ms. Sharon T. Lobello

To edit this monograph, Sharon T. Lobello drew on her twenty-plus years of experience as an editor in the technology arena. Sharon served as editor of *Electronic Education* for nearly a decade and, later, as publisher of *Academic Technology* magazine. She graduated from Heidelberg College in Tiffin, OH before earning a master's degree at Florida State University in Tallahassee, FL.

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